"COMPARATIVE EVALUATION OF POST OPERATIVE ANALGESIA USING ROPIVACAINE (0.5%) AND ROPIVACAINE (0.5%) WITH CLONIDINE (2mcg/kg) IN BILATERAL SUPERFICIAL CERVICAL PLEXUS BLOCK PRIOR TO GENERAL ANAESTHESIA FOR THYROID SURGERIES."

Dissertation submitted for

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BRANCH – X (Anaesthesiology)

MADRAS MEDICAL COLLEGE

THE TAMIL NADU Dr. M.G.R. MEDICAL UNIVERSITY

CHENNAI

APRIL 2013

CERTIFICATE

This is to certify that this dissertation entitled **"COMPARATIVE EVALUATION OF POST OPERATIVE ANALGESIA USING ROPIVACAINE (0.5%) AND ROPIVACAINE (0.5%) WITH CLONIDINE (2mcg/kg) IN BILATERAL SUPERFICIAL CERVICAL PLEXUS BLOCK PRIOR TO GENERAL ANAESTHESIA FOR THYROID SURGERIES"** is a bonafide record of the work done by DR.M.NANTHAPRABU under my supervision and guidance in the Institute of Anaesthesiology and Critical care at Madras Medical College Hospital, Chennai, during the period of his postgraduate study from May -2010 to April- 2013 for the partial fulfillment of M.D. (Branch – X Anesthesiology) degree.

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I am especially thankful to our Dean for allowing me to conduct my study in our hospital.

Last but not the least I am grateful to all my patients who made this study possible.

DECLARATION

I, **Dr.M.NANTHAPRABU**, solemnly declare that this dissertation entitled **"COMPARATIVE EVALUATION OF POST OPERATIVE ANALGESIA USING ROPIVACAINE (0.5%) AND ROPIVACAINE (0.5%) WITH CLONIDINE (2mcg/kg) IN BILATERAL SUPERFICIAL CERVICAL PLEXUS BLOCK PRIOR TO GENERAL ANAESTHESIA FOR THYROID SURGERIES"** is a bonafide work done by me in the Department of Anesthesiology, Madras Medical College and Government General hospital, Chennai, during the period 2010 to 2013 under the guidance of **Prof. Dr. M.VASANTHI, M.D., D.A., DNB,** Director, Institute of Anaesthesiology and Critical care, Department of Anesthesiology, Madras Medical College and Government General Hospital, Chennai – 3 and submitted to **The Tamilnadu Dr. MGR Medical University,** Guindy, Chennai – 32, in the partial fulfillment of the requirements for the award of the degree of MD Anaesthesiology (Branch X).

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CONTENTS

INTRODUCTION

Thyroid surgeries are usually performed under general anaesthesia, but can be successfully performed under regional anaesthesia[1] too. A deep plane of General anaesthesia is usually due to the combination of surgical procedure and tracheal stimulation due to the movement of endotracheal tube during surgery. Recovery may be delayed due to deep anaesthesia. So the short acting opioids can be used, but post operative hyperalgesia is a major disadvantage.

Pain after thyroid surgery is mild to moderate intensity. Some patients may require opioid or NSAIDS for first 24 hours. In a study by Gozal et al[2], the mean pain level on (VAS) was 6.9 and opiates were required in >90 % of patients. In addition to the pain, patient may have post operative nausea and vomiting[3] following thyroid surgeries.

Opioids can produce effective analgesia, but also produce unwanted side effects like nausea vomiting, urinary retention, somnolence and hypoventilation. These side effects may be attenuated by reducing the dose of opioids[4], but the analgesic efficacy might then be less than optimal.

Therefore various analgesic methods have been adopted like non-opioid analgesics, regional blocks[5] and local anaesthetic infiltration at the wound site.

Bilateral superficial cervical plexus block[6] is a popular regional anaesthetic technique which may reduce the analgesic requirements. In a study[7] using two point technique with bilateral superficial cervical plexus block found to be effective, but three point technique[34] still more improves analgesic effect of bilateral superficial cervical plexus block. This technique was used in previous studies. In one study[8] regional block was given without any adjuvant such as clonidine or epinephrine. Latter studies have proven that addition of clonidine increases the duration of analgesia. Danelli and colleagues[9] reported that cervical plexus block performed using ropivacaine with clonidine improved the quality of anaesthesia and prolonged the duration of post operative analgesia.

This study was conducted in patients undergoing total thyroidectomy, to compare the post operative analgesic efficacy of Bilateral Superficial Cervical Plexus Block performed before the induction of general anaesthesia, with ropivacaine (0.5%) and ropivacaine (0.5%) with clonidine (2mcg/kg).The primary aim of our study is to evaluate the duration of post operative analgesic efficacy of these drugs.

The secondary objectives were to evaluate the intra operative opioids dosage, to assess intra and post operative hemodynamic responses, post operative pain scores and the time of rescue analgesia.

AIM

To compare the post operative analgesic efficacy of ropivacaine (0.5%) and ropivacaine (0.5%) with clonidine (2mcg/kg) in bilateral superficial cervical plexus block performed prior to general anaesthesia for thyroid surgeries.

CERVICAL PLEXUS

Formation:

The cervical plexus[10] is formed by the ventral rami of the upper four cervical nerves. The rami emerge between the anterior and posterior tubercles of the cervical transverse process. All the rami divide into two except first cervical nerve. The four roots are connected with one another to form three loops.

Position:

The cervical plexus lies on the surface of scalenus medius and levator scapulae muscle and deep to internal jugular vein and Sternomastoid muscle.

Branches:

A. Superficial branches emerge at the superficial fascia of the neck near the midpoint of the posterior border of sternomastoid muscle.

1. Lesser occipital nerve (C2) ascends at the posterior border of sternomastoid muscle. It supplies the skin of the upper neck and behind the auricle.

2. Great auricular nerve (C2, 3) ascends across sternomastoid muscle to reach the skin over the parotid region. It supplies the skin over the upper neck and parotid region.

3. Transverse cervical nerve (C2, 3) crosses sternomastoid horizontally and supplies the skin over the anterior triangle.

4. Supra clavicular nerves (C3, 4) descend behind the sternomastoid muscle and supply the skin over the shoulder and upper pectoral region.

B. Deep branches:

1. Muscular branches supply the muscles of the neck and phrenic nerve supplies diaphragm.

2. Communicating branches: pass from the superior cervical ganglion, Hypoglossal nerve and Spinal accessory nerve

SUPERFICIAL CERVICAL PLEXUS

The superficial cervical plexus supplies the skin over the antero lateral aspect of the neck through anterior primary rami of C2 through C4. They emerge at the posterior border of the sternocleidomastoid muscle as four distinct nerves.

The lesser occipital nerve is a branch from stem of C2.The remaining stem joins with the part of C3 to form a nerve trunk which divides into greater auricular and transverse cervical nerve.

The remaining part of C3 runs downwards and joins with major part of C4 and forms supra clavicular trunk which divides into upper, middle and lower supra clavicular nerves.

Ascending branches:

1. Occipitalis major
2. Auricularis magnus
3. Superficialis coli
4. Supra sternal nerve

Descending branches:

1. Supra clavicular
2. Supra acromial

SUPERFICIAL CERVICAL PLEXUS BLOCK

The patient is positioned supine[11] with neck slightly turned to the opposite side and the posterior border of sternomastoid muscle is identified.

TWO POINT TECHNIQUE:[12]

A line is drawn from the mastoid process to Chassaignac`s tubercle of C6 transverse process. A 23 gauge spinal needle is inserted at the midpoint of this line, a skin wheal is raised. The spinal needle is directed cephalad towards the mastoid process along the posterior border of sternomastoid in a subcutaneous plane and 2-3 ml of local anaesthetic is injected as the needle is withdrawn. Avoid piercing the external jugular vein. As the needle reaches the wheal, it is rotated 180` and directed subcutaneously caudad toward the clavicle along the posterior border of sternomastoid muscle. A similar amount of local anaesthetic is injected as the needle is withdrawn.

THREE POINT TECHNIQUE:

Using three point injection[13] technique 10 ml of prepared solution was injected in both sides of neck.

A 23 gauge needle was inserted at the posterior border of sternocleidomastoid muscle, 2cm above the clavicle. The depth of the needle should be less than 5mm. 6ml of prepared mixture was given in cephalad

direction, 2ml in the transverse direction. These two injections are to block the greater auricular and transverse cervical nerves. 2ml of injection given at the site of needle puncture to block the supraclavicular nerve14. Many studies have shown that this technique is more effective than the two point technique.

Complications:

1. Infection (if sterility is not maintained during the procedure).
2. Hematoma formation.
3. Phrenic nerve palsy.
4. Local anaesthetic toxicity.
5. Spinal anaesthesia (accidental).

THYROID GLAND

ANATOMY:

Thyroid gland is a butterfly shaped organ[15], situated in the lower part of the front and sides of the neck. It regulates the basal metabolic rate, stimulates somatic and psychic growth, and plays an important role in calcium metabolism.

The gland consists of right and left lobes that are joined to each other by an isthmus. A third pyramidal lobe may project upwards from the isthmus. The gland lies against vertebrae $C_{5, 6, 7}$ and T1clasping the upper part of the trachea. Each lobe extends from the middle of the thyroid cartilage to the fourth or fifth tracheal ring.

The isthmus extends from the second to the third tracheal ring.

Capsules of the thyroid:

True capsule is the peripheral condensation of the connective tissue of the gland.

The false capsule is derived from pretracheal layer of deep cervical fascia.

Arterial supply:

Superior thyroid artery: a branch of external carotid artery, divides into anterior and posterior branches. It supplies anterior and posterior border of lobes respectively.

Inferior thyroid artery: a branch of the thyrocervical trunk which arises from the subclavian artery.

Sometimes the thyroid gland is also supplied by the lowest thyroid artery (thyroidea ima artery) which arises from the brachio cephalic trunk or directly from the arch of aorta.

Accessory thyroid artery arteries arising from tracheal and esophageal arteries also supply the thyroid.

Venous drainage:

The thyroid is drained by superior, middle and inferior thyroid veins

Superior thyroid vein ends in the internal jugular vein or in the common facial vein.

The **middle thyroid vein:** enters into the internal jugular vein.

The **inferior thyroid vein:** enters into the brachio cephalic vein

A fourth thyroid vein (of Kocher) may emerge between middle and inferior thyroid vein and drain into the internal jugular vein.

Lymphatic drainage:

Lymph from the upper part of the gland reaches upper deep cervical nodes either directly or through the pre laryngeal nodes.

Lymph from the lower part of the gland drains to the lower deep cervical nodes directly, and also through the pre tracheal and para tracheal nodes.

Nerve supply:

Nerves are derived mainly from the middle cervical ganglion and partly also from the superior and inferior cervical ganglia.

Structure and function:

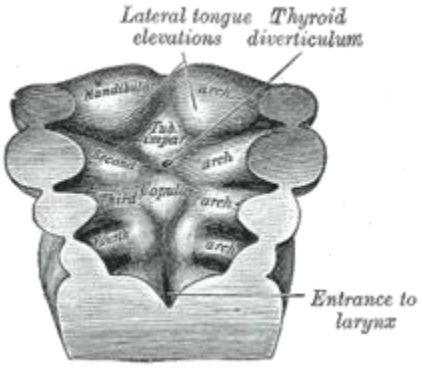
The thyroid gland is made up of two types of secretory cells[16]. Follicular cells lining the follicles of the gland secrete tri iodo thyronin and tetra iodo thyronin which stimulate basal metabolic rate and somatic psychic growth of the individual.

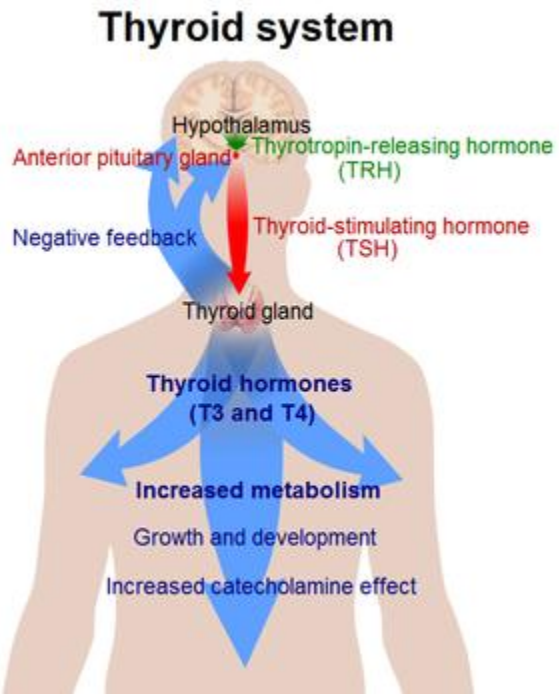
Para follicular cells lie in between the follicles. They secrete thyro calcitonin which promotes deposition of calcium salts in skeletal and other tissues.

Development:

The thyroid develops[15] from a median endodermal thyroid diverticulum which grows down in front of the neck and the floor of the primitive pharynx, just caudal to the tuberculum impar. The lower end of the

diverticulum enlarges to form the gland. The rest of the diverticulum remains narrow and is known as the thyroglossal duct.





Thyroid enlargement:

The term goiter is used to describe generalized enlargement of the thyroid gland.

Classification of thyroid swellings[17]:

Simple goiter

Diffuse hyper plastic

Multinodular goiter

Toxic

Diffuse

Multinodular

Toxic adenoma

Neoplastic

Benign

Malignant

Inflammatory

Auto immune

Chronic lymphocytic thyroiditis

Hashimoto`s thyroiditis

Granulomatous

Riedel`s thyroiditis

Indication for surgery in thyroid swellings:

Neoplasia

Toxic adenoma

Pressure symptoms

Cosmesis

Thyroid operations:

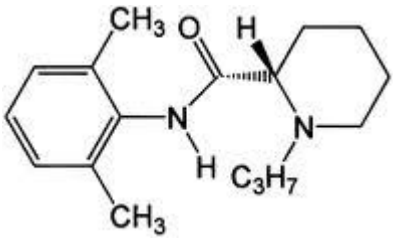
1. Total thyroidectomy=Bi total lobectomy +isthmectomy

2. Subtotal thyroidectomy=Bi subtotal lobectomy + isthmusectomy

3. Lobectomy= Unilateral total lobectomy +isthmusectomy

ROPIVACAINE

Ropivacaine is a long acting local anaesthetic agent[18] belonging to amino amide group .It is structurally related to Bupivacaine, but it is a pure *S*-enantiomer of 1-propyl-2c,6c-pipecoloxylidide[19] ,developed for the purpose of reducing cardio toxicity and improving motor and sensory blockade and even more motor-sparing than bupivacaine.



Physio chemical and pharmaco kinetic profile

Molecular weight	274
PKa	8.1
Partition co efficient	2.9
Mean uptake ratio	1.8
Protein binding	94%

Mechanism of action:

Ropivacaine blocks impulse conduction in nerve fibers by reversible inhibition of sodium ion influx. It is less lipophilic than and does not penetrate large myelinated motor fibers. It acts on the pain transmitting A- α and C nerves rather than A- β fibers which are involved in motor function.

Pharmacodynamics[20]:

Central nervous and cardiovascular system effects[21]**:**

Ropivacaine because of its less lipophylic and stereo selective properties has higher threshold for cardio toxicity and CNS toxicity.

Other effects:

-Inhibits platelet aggregation

-Antibacterial activity-inhibits the growth of staphylococcus aureus, E.Coli and pseudomonas aeruginosa.

Pharmacokinetics:

The plasma concentration of ropivacaine depends on

- Total dose administered
- Route of administration.

The absorption of ropivacaine from epidural space is complete.

The half life is 14 minutes at initial phase and 4.2 hours at slower phase.

Ropivacaine is bound to plasma proteins, mainly to alpha1 acid glycoprotein. The total plasma concentration of ropivacaine increases during continuous epidural infusion.

It rapidly crosses the placenta during caesarian section[22], however the total plasma concentration in foetal circulation is very low.

Metabolism and excretion:

Ropivacaine is mainly metabolized in the liver by aromatic hydroxylation by cytochrome P450 (CYP) 1A2 and N-dealkylation[22].

The excretion of ropivacaine is through the kidney and 86% of the drug is excreted through kidney after a intravenous injection.

Tolerability:

Ropivacaine is usually well tolerated in adults and paediatric patients irrespective of route of administration.

Epidural ropivacaine for surgery produces dose dependant side effects similar to Bupivacaine. The cardiovascular toxicity also increases due to excessive absorption from peripheral nerve blocks and sudden intra venous injection.

Ropivacaine is well tolerated in the foetus in women undergoing lower segment caesarean section. The most common side effects with ropivacaine were neonatal jaundice, bradycardia.

Drug interactions:

Ropivacaine is used with caution when using with other local anaesthetics or agents with similar amide groups because of additive toxic effects.

1. Fluvoxamine-inhibitor of cytochrome P4501A2. It can interact with ropivacaine and increase the plasma level of ropivacaine when given concomitantly.

2. Interact with Imipramine and theophylline which are metabolised by CYP1A2 via competitive inhibition**.**

Dosage:

Indication	**Concentration%**	**volume**	**dose**
Surgical anaesthesia			
Lumbar epidural (Caesarean section)	0.75	15-20 ml	113-50mg
Lumbar epidural	0.75	15-25ml	113-188 mg
Other surgery	1	15-20ml	150 200mg
Thoracic	0.75	5-15ml	38-113 mg
Intra thecal administration	0.5	3-4ml	15-20mg
Peripheral nerve block	0.75	10-40ml	75-300 mg
Field block	0.75	1-30 ml	7.5-225 mg
Postoperative pain			
Lumbar epidural (Continuous infusion)	0.2	6-10 mL/h	12-20 mg/h
Thoracic epidural (Continuous infusion)	0.2	6-14 mL/h	12-28 mg/h
Peripheral nerve block (Continuous infusion)	0.2	5-10 mL/h	10-20 mg/h
Field block†	0.2	1-100 mL	2-200 mg
Intra-articular injection	0.75	20 mL	150 mg
Labour pain(lumbar epidural)			
Bolus	0.2	10-20 mL	20-40 mg
Intermittent top-ups	0.2	10-15 mL	20-30 mg
Continuous infusion	0.2	6-14 mL/h	12-28 mg/h
In Children			
Caudal epidural block (Below T12)	0.2	1 mL/kg	2 mg/kg
Peripheral nerve block (Eg, ilioinguinal block)	0.5	0.6 mL/kg	3 mg/kg

Clinical applications:

The efficacy[23] of ropivacaine has been evaluated by various clinical trials and compared with Bupivacaine and its isomers.

1. Surgical anaesthesia:

Ropivacaine is an effective anaesthetic when administered via epidural, intra thecal and peripheral nerve blocks.

Epidural ropivacaine:

Ropivacaine is mainly administered via lumbar route and used for caesarean section, gynecological surgeries, various abdominal procedures, orthopaedic surgery and vascular surgery. In the latter procedures, it is mainly used for post operative pain relief.

2. Intra thecal administration:

Intrathecal ropivacaine

Ropivacaine is administered at higher doses for intrathecal administration than bupivacaine. Hyperbaric solutions of ropivacaine have a faster onset of action and faster recovery from the block and it provides a more predictable block.

3. Peripheral nerve blocks:

Peripheral nerve blocks are used for orthopaedic surgeries. Ropivacaine 0.5% provides sensory and motor block for inter scalene, brachial plexus and axillary block for hand and arm surgery. Ropivacaine 0.75% had faster onset of action for femoral, sciatic and combined femoral and sciatic block for lower limb surgeries.

4. Post operative pain management:

Epidural ropivacaine[24] is used for post operative pain relief in upper and lower abdominal surgeries, lower limb, orthopaedic and gynecological surgeries.

5. Management of labour pain:

Epidural ropivacaine is used for labour analgesia[25].

Dose: Ropivacaine0.2% 10-20 ml bolus with intermittent top up injections (20-30mg) / continuous epidural 6-10ml/hr[26].

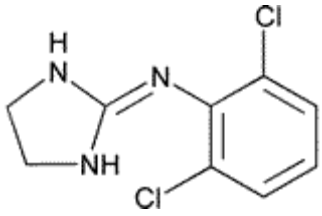
The addition of fentanyl[27] 2mcg/ml to 0.1% ropivacaine (10ml/hr) significantly reduces ropivacaine concentration and the quality of analgesia is equal to ropivacaine 0.2% solution. Addition of clonidine[9] also significantly increases the duration of action of ropivacaine.

6. Chronic pain management:

Ropivacaine is used in management of chronic low back pain[28] and as a palliative procedure in the management of refractory migraine[29].

CLONIDINE

Clonidine is an imidazoline derivative[30] having complex actions. It is a partial agonist with high affinity to alpha 2 receptors especially alpha 2A subtype.



Mechanism of action [18]:

Alpha2 adrenergic agonists produce clinical effects by binding to alpha2 receptors which have three subtypes (α2A, α 2B, α 2C).

Alpha2A receptors mediate sedation and sympatholysis. Alpha2B receptors mediate vasoconstriction.

The alpha2 receptors are present in the pontine locus cereleus. Clonidine stimulates alpha2 adrenergic neurons in the medulla to cause a decrease in sympathetic outflow to peripheral tissues from the central nervous system. A decrease in sympathetic activity causes peripheral vasodilatation and a decrease in blood pressure, heart rate and cardiac output.

The alpha2 receptors in the blood vessels produce vasoconstriction and inhibit the neither release of nor adrenaline at peripheral sympathetic nervous system nerve endings.

It is a moderatively potent antihypertensive agent. The quality of sedation produced by clonidine differs from that produced by drugs that act on GABA receptors (Midazolam, propofol).

Pharmacokinetics[30]:

Clonidine is well absorbed orally[31]. Effect of a single dose lasts for 6-24 hrs and peak effect occurs in 2-4 hrs. Up to 50% is metabolized in the liver and 1/2 to 2/3 of oral dose is excreted unchanged in urine.

Dose:

Start with 100mcg o.d or bid. Maximum dosage: 300mcg tds orally or i.m.

Transdermal form:

Catapres TTS delivers clonidine 100mcg, 200mcg or 300mcg daily for 1 week

Parenteral form:

Clonidine hydrochloride 150mcg/ml ampoule

Effects on organ systems:

Cardio Vascular Effects:

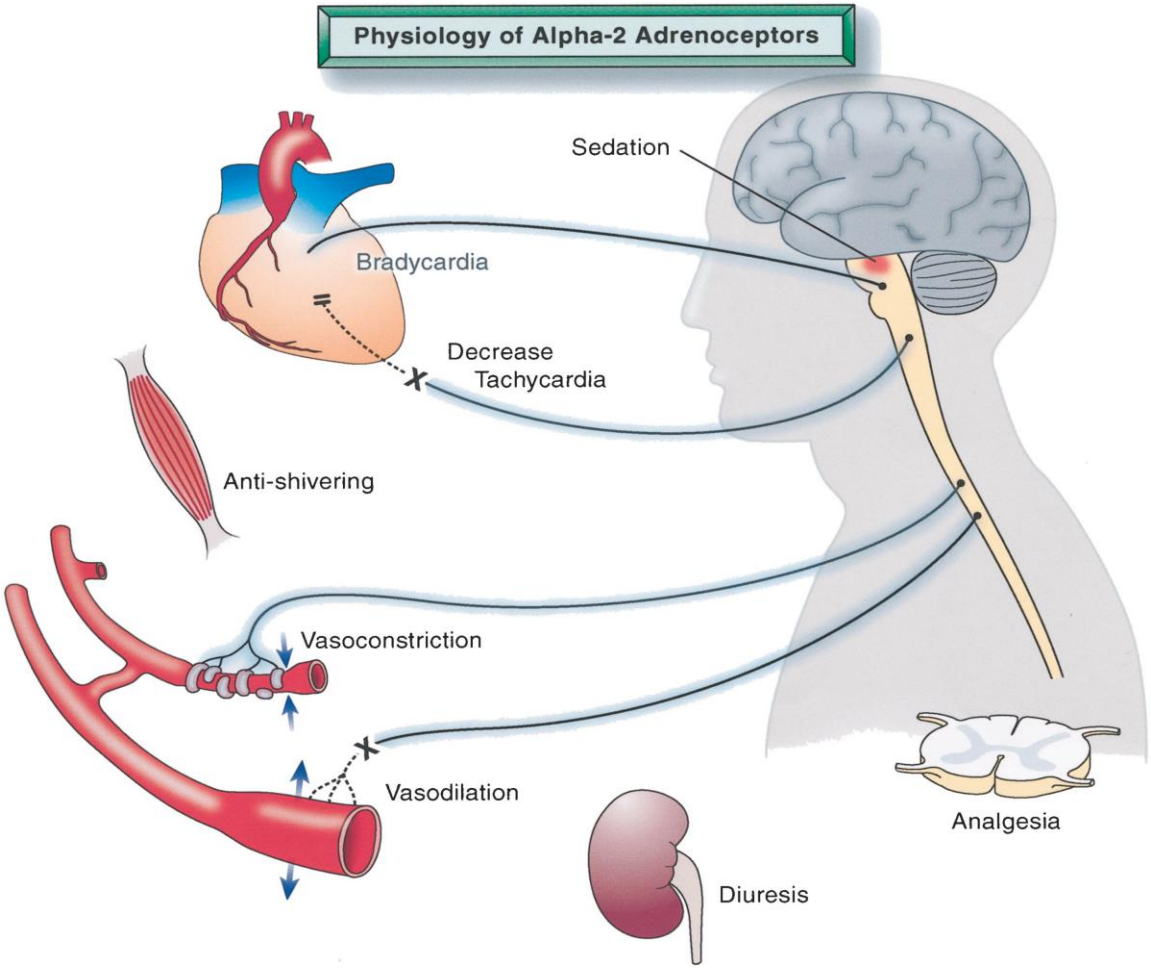
Clonidine decreases systolic blood pressure more than diastolic blood pressure. In patients treated over a long period of time, systemic vascular resistance is little affected, and cardiac output which is initially decreased, returns toward predrug levels. Homeostatic cardiovascular reflexes are maintained, thus avoiding the problems of orthostatic hypotension. In clonidine therapy, renal blood flow and glomerular filtration rate are maintained.

Respiratory effects:

Clonidine has minimal depressant effects on ventilation. Morphine induced depression of ventilation is not potentiated by clonidine.

Central nervous system:

Sedation and anxiolysis are the most consistent effects mediated by central alpha 2 receptors. Clonidine is a potent analgesic and its action that cannot be reversed by naloxone, indicating that analgesic effect of clonidine and opioid through independent receptor mechanisms. There is a 50% decrease in MAC of inhalational anesthetics and decreased anesthetic requirements of opioids. It also prevents shivering.


Physiology of Alpha-2 Adrenoceptors
Sedation
Bradycardia
Decrease
Tachycardia
Anti-shivering
Vasoconstriction
Vasodilation
Analgesia
Diuresis

Clonidine is also effective in suppressing signs and symptoms of withdrawal from opioids, benzodiazepines and ethanol

Adverse effects[31]:

Side effects with clonidine are relatively common.

1. Sedation, mental depression, disturbed sleep, dryness of mouth, nose and eyes (secretion decreased by central action) and constipation (antisecretory effect on intestine).

2. Impotence, salt and water retention, bradycardia due to reduced sympathetic tone.

3. Postural hypotension may occur but it is mostly asymptomatic.

4. Alarming rise in BP with tachycardia, restlessness, anxiety, sweating, headache, nausea and vomiting occur in some patients when clonidine doses are missed for 1-2 days. The syndrome is very similar to that seen in phaeochromocytoma. Plasma catecholamine concentration was increased. This is due to

a) Sudden removal of central sympathetic inhibition resulting in release of large quantities of stored catecholamine.

b) Super sensitivity of peripheral adrenergic structures to catecholamines that develops due to chronic reduction of sympathetic tone during clonidine therapy.

Interactions:

Tricyclic anti depressants and chlorpromazine abolish the antihypertensive action of clonidine by blocking alpha receptors by which clonidine acts.

USES:

1. Antihypertensive:

Clonidine was a popular antihypertensive drug in the late 1960s and 1970s, but frequent side effects, risk of withdrawal hypertension and development of tolerance made it as a third or fourth drug of choice.

2. Analgesia:

Clonidine injected into the epidural or sub arachnoid space (150-450mcg) produce analgesia but unlike opioids does not produce depression of ventilation, nausea, vomiting and delayed gastric emptying.

Clonidine (1mcg/kg) added to lignocaine is used for TIVA. It enhances post operative analgesia.

3. Pre anaesthetic medication:

Oral clonidine 5mcg/kg

a) Blunts reflex tachycardia during intubation.

b) Decreases BP and heart rate intra operatively.

C) Decreases anaesthetic requirements of injected and inhaled drugs.

d) Decreases plasma noradrenalin levels.

4. Prolonging the effects of regional anaesthesia:

Addition of clonidine to Bupivacaine or other local anaesthetics for spinal anaesthesia prolongs the duration of both sensory and motor blockade[41].

The need for infusion of fluids and decrease in diastolic pressure may be greater in patients receiving local anaesthetics with clonidine.

Clonidine has been used by spinal, epidural, parenteral, intra articular and perineural routes to supplement postoperative analgesia produced by local anesthetics.

5. Central nerve blocks:

Clonidine produces dose dependent analgesia when administered into the epidural or subarachnoid space. Activation of post synaptic receptors in substantia gelatinosa of the spinal cord is the presumed mechanism for analgesic effect in central neuraxial blockade.

Epidural or intrathecal clonidine is not neurotoxic, with large doses of epidural clonidine to achieve long term analgesia, side effects like sedation, hypotension and bradycardia are common. Thus epidural clonidine is usually

used with opioids or local anaesthetics for post operative analgesia (10-15mcg/kg) to avoid side effects.

The maximum dose of intrathecal clonidine with local anaesthetics is 1 mcg /kg and it improves the duration and quality of the block.

In children Caudal clonidine is combined with local anesthetics to increase the duration of anesthesia without hemodynamic side effects. The dose of clonidine is 2 and 3 µg/kg.

6. Peripheral nerve blocks:

Clonidine is usually used as an adjuvant to local anesthetics in peripheral nerve blocks to prolong the duration of analgesia and anesthesia. It improves the quality of analgesia after surgery over 24 hours for some extremity blocks.

The addition of clonidine to lignocaine improves the quality of intravenous regional anesthesia and tolerance of the tourniquet.

7. Protection against perioperative myocardial ischemia:

Clonidine decreases mortality following cardiovascular surgery by decreasing the incidence of myocardial ischemia and infarction.

Clonidine 0.2mg at the morning or evening before surgery in patients at risk of CAD and continued for four days decrease the incidence of perioperative myocardial ischemia.

8. Treatment of shivering:

Administration of clonidine 75mcg iv stops shivering by inhibiting central thermoregulatory control.

9. Diagnosis of phaeochromocytoma

10. Treatment of opioid and alcohol withdrawal syndromes.

11. Attenuates vasomotor symptoms of menopausal syndrome

12. To control loose motions due to diabetic Neuropathy

Contraindications

Disorders of cardiac impulse generation and conduction like sino-atrial disease, atrioventricular node disease and patients with cardiac pacemakers.

ASSESSMENT OF PAIN

Pain is a subjective and highly personal phenomenon unique to the individual. The definition of pain is ‘an unpleasant sensory and emotional experience associated with actual or potential damage or described in terms of such damage’

Acute pain is relatively straightforward to assess as, unlike chronic pain, it generally bears a predictable relationship to obvious tissue damage. Because the level of postoperative pain tends to change rapidly throughout the postoperative course, especially early after surgery, a policy of regular assessment of pain using simple measurement tools is the best way to ensure that pain treatment can be appropriately titrated. Pain is considered as the “fifth vital sign”[32].

Accurate assessment of post-operative pain is mandatory to ensure that pain is managed effectively.

Tools for Evaluation of Pain[33]:

Many pain scoring systems are available to assess the severity of pain.

a) Categorical: This is a four or five point scale grading .The pain is graded as none, mild, moderate, severe and excruciating. The disadvantage of this scale is, it lacks sensitivity, but the advantage is its simplicity.

b) Numerical scale: This is an 11 point scale from 0 to 10. “0” means no pain. “10” is the worst imaginable pain.

c) Visual Analogue Scale (VAS): This is a 100 mm scale. No pain at one end and at the other end worst imaginable pain at the other. Visual analogue scale is most commonly used.

d) McGill Pain Questionnaire (MPQ): MPQ measures pain multi-dimensionally. It measures affective, sensory, evaluative and other aspects of pain and its questionnaire contains about 20 aspects.

1 to 10 -sensory aspects of pain,

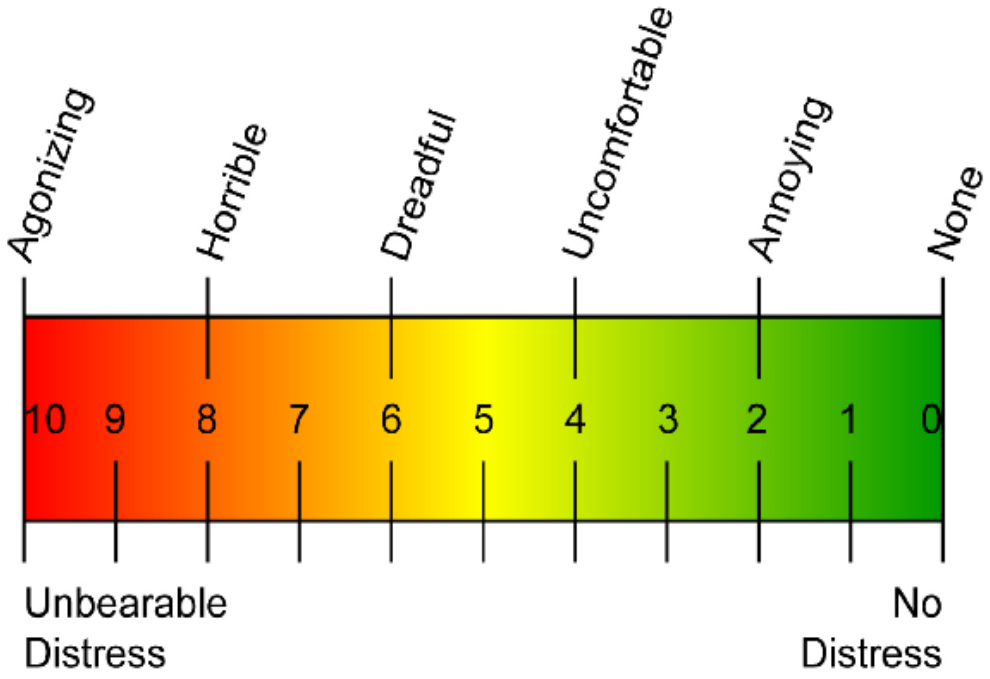
11 to 15 - affective aspect of pain,

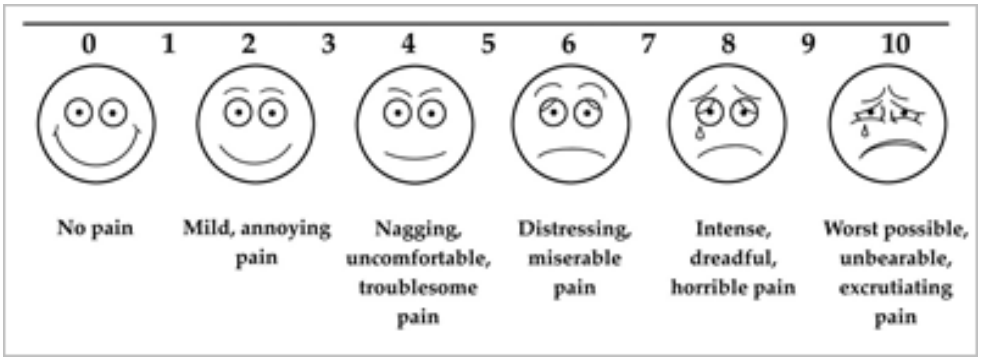
16 -evaluative aspect of pain,

17 to 20 -miscellaneous aspects of pain. Each subunit has 2 to 5 points under them. The sum of all points gives a rank value, which is termed the Pain Rating Index.

e) Happy-sad face –A set of faces that a child or an illiterate person can use to indicate the severity of his pain. This scale shows a child’s face in

different moods. The person is asked to select the facial expression that best suites the pain expression to assess the affective and fear component of pain.





SEDATION

The effective management of pain, sleep and anxiety are the main aims of a sedation therapy regimen. The management of pain is an important one in the management of sedation. Adequate post operative analgesia may reduce the necessity for other sedation therapy.

Sedation Scoring Systems:

Four sedation scoring systems are available. They are:

1. The Ramsay Sedation Scale;
2. The Sedation Agitation Scale;
3. The Motor Activity Assessment Scale
4. The Comfort Scale [19] for the pediatric population:

The Ramsay Sedation Scale:

This was the first scale to be defined. It was designed as a test of arousability. The RSS score has six different levels, according to how arousable the patient is. It can be added to the pain score and should be considered the sixth vital sign.

Ramsay Sedation Scale

Score	Response
1	Anxious, agitated or restless or both.
2	Co operative, oriented, tranquil.
3	Responding to commands only.
4	Brisk response to light glabellar tap.
5	Sluggish response to light glabellar tap.
6	No response to light glabellar tap.

Disadvantage of the RSS:

1. Patients who have received neuromuscular blocking drugs cannot be assessed in this manner, since this scale relies on the ability of the patient to respond.

2. Level 1 score, there is no further definition of the degree of agitation. The Sedation-Agitation Scale is taken into consideration.

3. In level 6 score, there is no further information as to whether the patient is in a lighter plane of general anesthesia or deep coma. This assessment can be monitored by spectral array signal from an EEG, A BIS index of 61.7 correlates well with a RSS of 6.

REVIEW OF LITERATURE

1. G. Andrieu et al H. Amrouni1, E. Robin1,[34] studied the intra operative and post operative analgesic efficacy of BSCPB performed in patients undergoing thyroidectomy under general anaesthesia , using ropivacaine or ropivacaine with clonidine 5 µg/ml. During intraoperative period, the opioid requirements were reduced significantly in ropivacaine plus clonidine group. Systolic Blood Pressure was reduced significantly in Group RC (ropivacaine and clonidine) compared with the other groups at the end of surgery and at extubation. The maximum reduction in Systolic Blood Pressure with induction was 28% for Group RC (ropivacaine and clonidine) and 24% for Groups R (ropivacaine) and P (saline group). There was no difference in blood pressure between Groups R (ropivacaine only) and P (saline group). There was no difference in the heart rate between the groups. The requirement of Sulfentanil was reduced significantly in Group RC (ropivacaine and clonidine) compared with Groups P (saline group) and R (ropivacaine only) (P, 0.005). The requirements of Nefopam during the first 24 h after surgery were reduced significantly in Groups R (ropivacaine only) and RC (ropivacaine and clonidine) compared with Group P (control group) (P¼0.03), but there was no difference between R and RC. Group R

(ropivacaine only) has less pain score median (range) 3 (0–10) (P¼0.01).Pain scores were significantly lower in RC (ropivacaine and clonidine) 3 (0–8) than in Group P (control group) 5(0–8) at admission into PACU. They concluded that, Bilateral Superficial cervical plexus block is a technique that effectively reduces intra operative and post operative analgesic requirements. The addition of clonidine with ropivacaine improves intraoperative and post operative analgesia.

2. Ruth Landau et al [35] they studied the effects of clonidine with ropivacaine for labor analgesia through epidural route. They selected 66 women in early labor. They were randomized to Group 1 to receive ropivacaine (0.1%) 8 mL plus clonidine 75mcg, Group 2 ropivacaine (0.2%) 8 mL plus 0.5% normal saline and Group 3 ropivacaine (0.2%) 8 mL plus clonidine 75mcg. The duration of analgesia was increased in Group 1(132$\pm$ 48 min) and in Group 3 (154$\pm$42 min) versus Group 2 (91$\pm$ 44 min) $P <$ 0.05). The total dose of ropivacaine in the first 4 hour was significantly reduced in Group 1(40.5 $\pm$15 mg) and Group 3 47.0 $\pm$16 mg) [versus in group 2(72.5$\pm$18 mg) P<0.01). The incidence of more profound motor block was more frequent in Group 2(P< 0.05). This study evaluated the effect of ropivacaine with adjuvant clonidine.

3. Rita Pal et al [36] studied the analgesic efficacy of cervical plexus block using bupivacaine and clonidine. The duration of post operative analgesia was significantly higher in bupivacaine plus clonidine group (8.19 ± 3.2 hour) than in bupivacaine group (5.24 ±1.6 hours). In the bupivacaine plus clonidine group, total dosage of fentanyl in postoperative period was also significantly less.

4. Sophie Aunac et al [37] studied the analgesic efficacy of superficial and deep cervical plexus block in patients undergoing thyroid surgeries under general anesthesia. Bilateral combined deep and superficial cervical plexus block was given with saline (Group 1), ropivacaine (Group 2), or ropivacaine with clonidine 7.5 μg/mL (Group 3). They observed that the number of additional alfentanil boluses during surgery was reduced significantly in Groups 2 and 3 compared with Group 1. The opioid and non-opioid analgesic requirements after surgery were also reduced significantly in Groups 2 and 3 during the first 24 h.

5. Danelli G et al[9] evaluated the effects of ropivacaine 150mg with clonidine 50mcg for superficial cervical plexus block in patients undergoing

elective carotid endarterectomy. They concluded that BSCPB improved the quality of anesthesia in patients undergoing elective carotid endarterectomy.

6. Ming-Lang Shih et al [38] evaluated the post operative analgesic efficacy of BSCPB in patients undergoing thyroidectomy and to assess whether BSCPB reduced the side effects of general anesthesia. They concluded that it reduces requirements of general anesthetics during surgery. It also lowers the postoperative pain significantly during the first 24 hours.

7. Nathalie Dieudonne et al [39]**evaluated** the analgesic efficacy of BSCPB performed at the end of thyroid surgery using 20 mL normal saline or bupivacaine 20 ml (0.25%) with epinephrine(1in 2L). The Bupivacaine group needed less morphine post operatively and lower initial median pain scores. It was concluded that BSCPB provides significant analgesia in the postoperative period after thyroid surgery.

8.Rowan R. Molnar et al [40]compared the effect of clonidine 5 μg/mL with lignocaine 1.5% for cervical plexus blockade with the addition of epinephrine 5 μg/mL with lignoaine for carotid endarterectomy. The block onset time and duration were the same between the two groups. In the

epinephrine group, the heart rate was increased significantly as compared with the clonidine group. They concluded that the addition of clonidine 5 μg/mL to lidocaine 1.5% reduce the incidence of tachycardia in cervical plexus block

9. Susmita Chakra borty et al [41] evaluated the efficacy of brachial plexus block using bupivacaine with clonidine. They concluded that duration of analgesia is prolonged when using bupivacaine with clonidine for brachial plexus block without producing any adverse reactions other than sedation.

10. Giovanni Cucchiaro et al [42] studied the effects of clonidine in various peripheral nerve blocks in children on the duration of analgesic effect. The patients received either ropivacaine or other local anesthetic and a combination of clonidine with ropivacaine or other local anesthetic .The duration of analgesia was significantly longer in the clonidine with local anaesthetics (17.2 ± 5 h) compared with that in the local anaesthetic group (13.2 ± 5 h). The increase in duration was not depending upon the local anesthetic used, type of peripheral nerve block, and operation performed.

11. Andrea Casati et al [43] demonstrated that prolonged duration of analgesia with the addition of clonidine 1mcg/kg with ropivacaine 0.75%, when providing sciatic-femoral nerve block, with no hemodynamic adverse effects and mild increase in degree of sedation.

12. **H. El Saied et al** [44]demonstrated that addition of 150 μg of clonidine to ropivacaine prolongs the duration of block and analgesia in a brachial plexus block, without any significant side effects.

13. Brian D. Sites et al [45] studied the effects of intrathecal clonidine for total knee arthroplasty using a hyperbaric bupivacaine spinal anesthetic. It was concluded that the addition of intrathecal clonidine with morphine decreased analgesic requirements and morphine consumption. The 24 hour VAS score was less when compared with intrathecal morphine alone.

14. Scott S. Reuben et al [46] studied the effect of clonidine in intravenous regional anesthesia with other local anaesthetics. They concluded that the addition of 1 μg/kg clonidine to lidocaine, 0.5%, for IVRA in patients undergoing ambulatory hand surgery improves postoperative analgesia without causing significant side effects during the first postoperative day.

15. DJ Reinhart et al [47] compared the effect of lidocaine (1.73%) and clonidine (10mcg/ml) with lidocaine alone for peripheral nerve block for foot surgery .They concluded that addition of clonidine increases the duration and quality of postoperative analgesia significantly.

16. Zeynep Eti et al [48], they compared the analgesic efficacy of BSCPB and local anesthetic wound infiltration after thyroidectomy.45 patients were divided into 3 groups. Bilateral superficial cervical plexus block was performed after general anaesthesia, with 15 ml of bupivacaine (0.25%) in each side in Group I, and 20 ml of local anesthetic wound infiltration with bupivacaine (0.25%) in Group II. In Group III (control) no regional block was administered. Postoperative analgesic requirement was evaluated by intravenous patient-controlled analgesia. Visual analogue scale scores and total analgesic doses were same among groups. They concluded that BSCPB or infiltration of local anesthetic with bupivacaine (0.25%) did not reduce analgesic requirement after thyroid surgery.

17. B. Vallet and G. Lebuffe[49] In this study 50 patients were randomized in to two groups, to receive either 20 mL of normal saline(Saline group) or 20 mL of 0.25% bupivacaine (Bupivacaine group). BSCBs were performed before induction of general anaesthesia. Post operatively patients were transferred to the PACU. Morphine was administered in PACU if VAS score was more than 4. Post operative pain and all adverse effects were recorded at PACU. They assessed pain scores and amount of morphine required.

The Bupivacaine group had less analgesic requirements (24% vs. 72%; P = 0.0016). Patients who received BSCPB had significantly lower VAS. They concluded that BSCPB reduce pain intensity significantly and also reduces opioids requirement in the postoperative period after thyroid surgery.

18. Isaak Kesisoglou, MD, PhD, Theodossis et al[50]

This study evaluated the effects of bilateral superficial cervical plexus block in 100 patients undergoing thyroidectomy. BSCPB was done with 20 ml of ropivacaine 0.75%.Precoxib was administered immediately and 12 hours postoperatively. Pain scores were recorded 0, 3, 6, 9, 12 and 24 hours after thyroidectomy. Pain score was higher in control group than ropivacaine group ($p<.05$). Analgesic requirements were equal in both groups. They

concluded that BSCPB significantly reduce the post operative pain scores and has a major effect on post operative analgesia on patients after total thyroidectomy with no significant difference in analgesic requirements.

MATERIALS AND METHODS

This study was a Prospective, randomized, double blinded study conducted among 60 patients who were undergoing total thyroidectomy for multinodular goiter under General anaesthesia at Rajiv Gandhi Government General Hospital, Chennai from 2010 to 2012.

The study was approved by institutional ethical committee and informed consent was obtained from all the patients in the study.

Selection of cases:

Inclusion criteria:

- Age : 18 years to 60 years.
- ASA : I & II.
- Surgery: Elective.
- Euthyroid state.
- Who have given valid informed consent.

EXCLUSION CRITERIA:

- Patients with malignant thyroid disorders.
- Patients with retrosternal goitre.
- Coagulation disorders.
- Pregnancy.
- Age < 18 yrs.
- Patient refusal.
- Patients with severe cardiovascular, respiratory, renal, hepatic diseases.
- Emergency cases.
- Patients with difficult airway.

Pre operative thorough physical and clinical examination was done and all the basic investigations verified. Airway assessment was done.

Patients were randomized by closed envelope method into Group A, B and C. (Group A) to receive isotonic saline, (Group B) injection ropivacaine 0.5% and (Group C) injection ropivacaine 0.5% and Clonidine 2mcg/kg.

Patients in all the 3 groups were given general anesthesia. The base line heart rate, Blood pressure and Spo2 were recorded. All patients were preloaded with 10 ml/kg of normal saline and premedicated with injection Glycopyrrolate 0.2mgi.v.

Induction was done with Inj. Fentanyl 2ug/kg, Inj. thiopentone 4mg/kg followed by inj.atracurium0.5 mg/kg and intubated with endotracheal tube of appropriate size, maintenance with N20;02 2;1, sevoflurane 1%. The injection was given to Anaesthesiologist in unlabelled syringes. The specific injection given was not known to the patient, surgeon, anaesthesiologist and doctor involved in the assessment of pain score at PACU.

Bilateral superficial cervical plexus block was performed by an anaesthetist who was familiar in this technique before induction and incision.

Using three point injection technique 10 ml of prepared solution was injected in each sides of neck.

A 23 gauge needle was inserted at the posterior border of sternocleidomastoid muscle, 2cm above the clavicle. The depth of the needle should be less than 5mm. 6ml of prepared mixture was given in cephalad

direction, 2ml in the transverse direction. These two injections were for blocking the greater auricular and transverse cervical nerves. 2ml of injection at the needle puncture site to block the supra clavicular nerves.

Intra operatively systolic blood pressure, diastolic blood pressure, heart rate and Spo2 were measured every 5 minutes up to 30 minutes and then every fifteen minutes till the surgery is over. Injection atracuriun 5 mg was given every 30 minutes. Injection Fentanyl was given every 60 minutes and additional doses were administered for any variation in blood pressure and heart rate for group A**.** The duration of surgery and Fentanyl requirements were calculated.

At the end of surgery patient was reversed with Inj. neostigmine 40-50mcg/kg and Inj Glyco 0.4mg i.v., and extubated after adequate neuromuscular recovery. Post operative laryngoscope was done for assessing vocal cord movements.

Post operatively patient was shifted to PACU. In PACU post operative pain score was assessed using visual analog score (VAS) and heart rate, systolic and diastolic blood pressure, mean arterial pressure and sedation score were recorded for every 30minutes upto 6 hours and every 4 hours upto 24 hours.

IV paracetamol infusion was administered 6^{th} hourly. Pain score was assessed at admission to PACU. Injection Diclofenac sodium 75mg i.v infusion in 100ml saline over 20 mins as rescue analgesia was given to patients with VAS score more than 5.

OBSERVATION AND RESULTS

All the enrolled 60 patients completed the study protocol. All the data were entered into Microsoft excel software and statistical analysis was done using SPSS Software version 15.0.

Statistical analysis

All parametric data were analyzed with chi square test, student t test.

All non parametric data were analyzed with one way anova.

The data analyzed were,

1. Demographics and duration of surgery.

2. Duration of post operative analgesia.

3. Post operative VAS score.

4. Rescue analgesia requirements.

5. Total dosage of fentanyl.

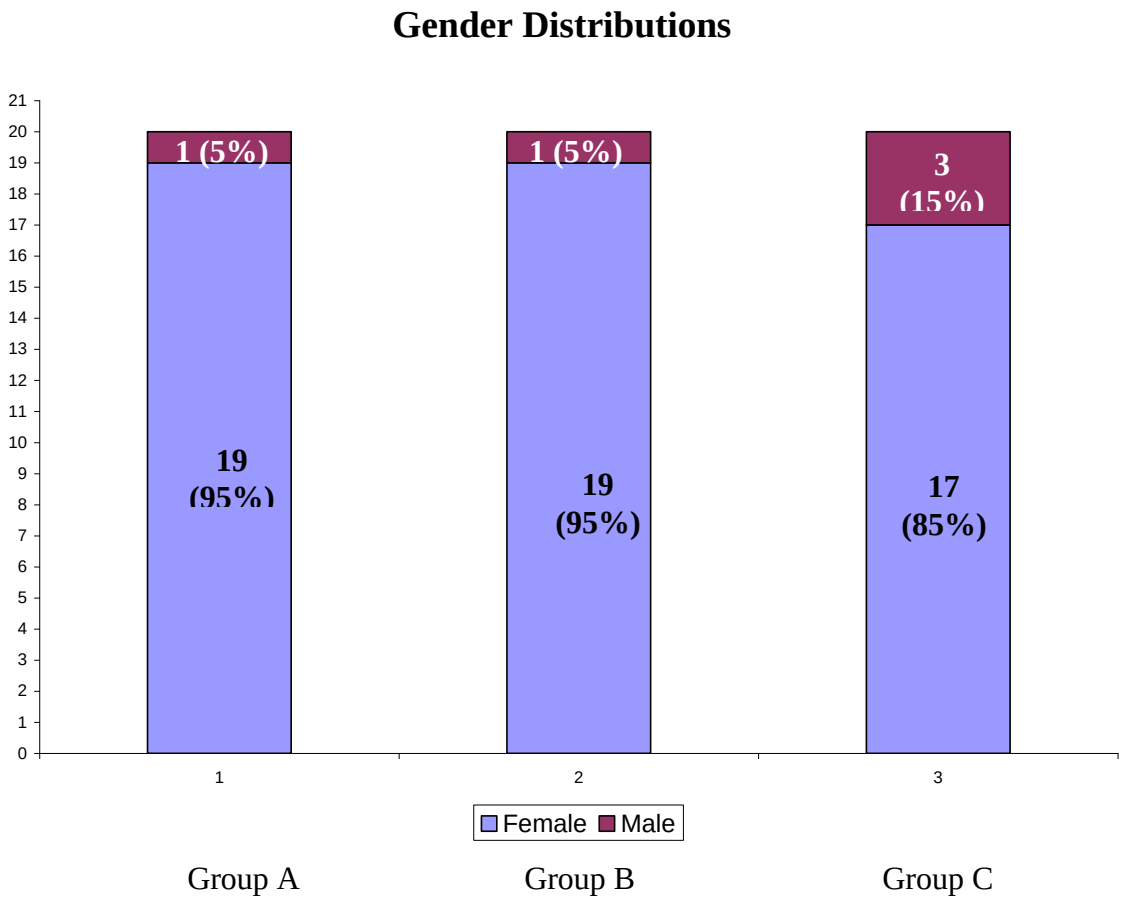
6. Haemodynamic status during preoperative Baseline, induction, intubation, intra operative and post operative.

7. Sedation score.

8. Side effects.

1. Demographics:

Demographic characteristics like age, BMI were similar in all three groups except gender where female were predominant.



	Group A	Group B	Group C	P value
Age	36.95±10.58	39.55±11.01	38.70±11.38	0.749
BMI	21.94± 0.85	21.99±0.8	22.44±0.84	0.393

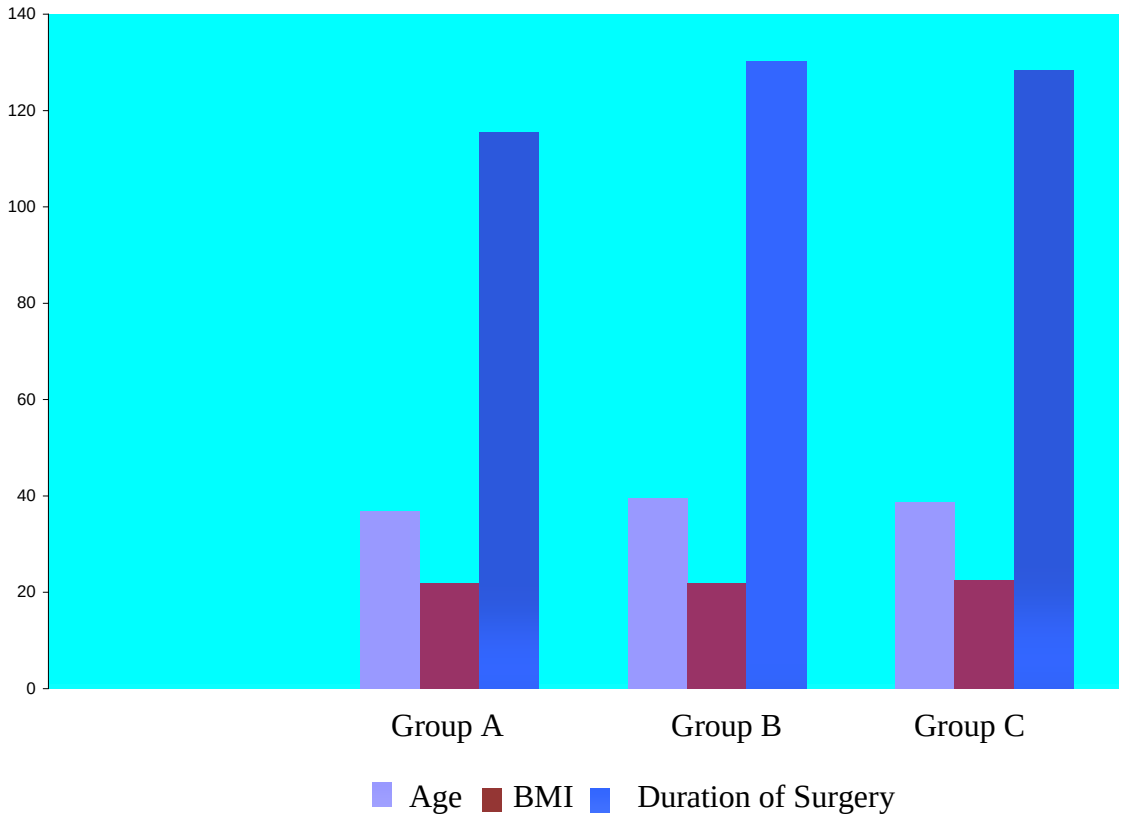
Gender	Group A	Group B	Group C
Female	19 (95%)	19(95%)	17(85%)
Male	1(5%)	1(5%)	3(15%)

Duration of surgery:

	Group			
	Group A(n=20)	Group B(n=20)	Group C(n=20)	
	Mean ± SD	Mean ± SD	Mean±SD	P-value
Duration of surgery	115.50 ± 26.60	130.25±15.68	128.25±30.75	0.142

Duration of surgery in group A was 115± 26.60 minutes, Group B was 130.25±15.68and in Group C was 128.25±30. There is no statistical difference in the duration of surgery among three groups.

Demographic Data



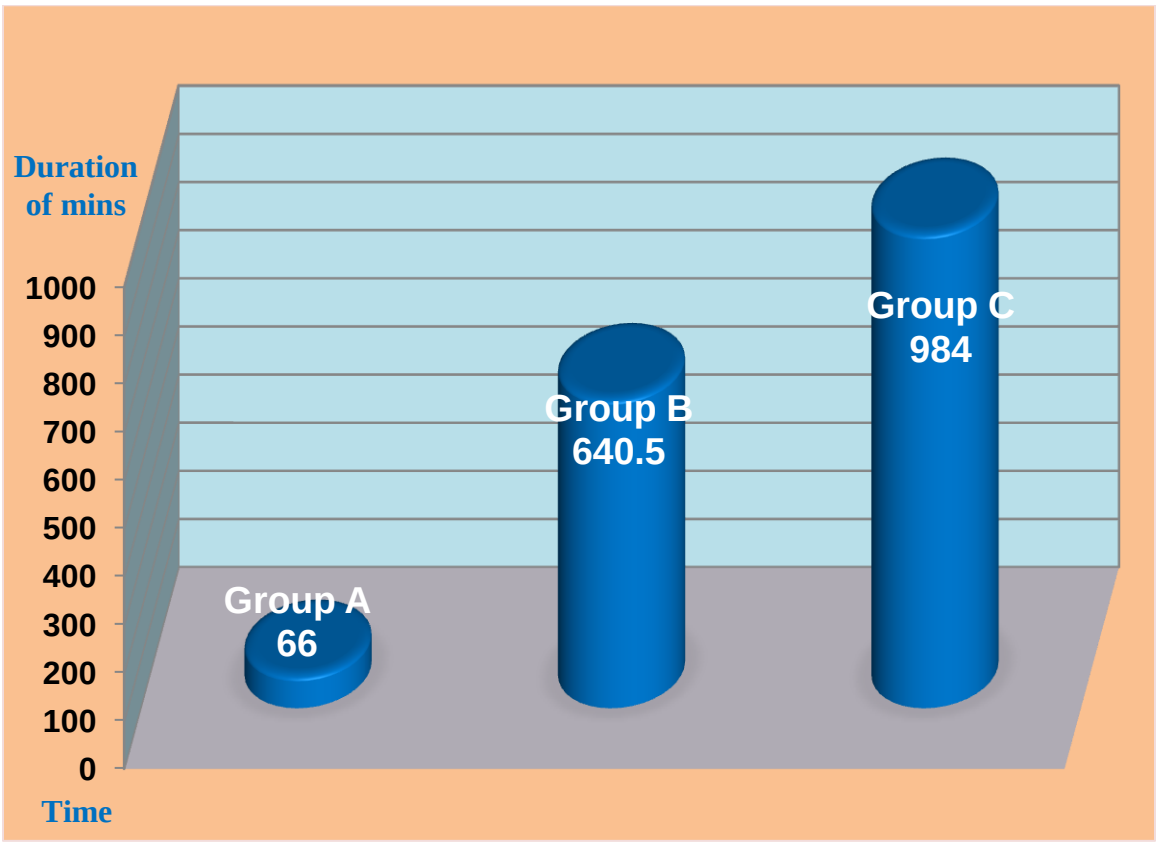
2. Mean duration of analgesia:

	Group			P-value
	Group A(n=20)	Group B(n=20)	Group C(n=20)	
	Mean ± SD	Mean ± SD	Mean±SD	
Duration of analgesia(mins)	66.00±58.88	640.50±150.24	984.00±120.63	<.001**

**- highly significant

In group A 14 patients (70%) had pain at the time admission into PACU. In Group A the mean duration of analgesia was 66.00±58.88 minutes In Group B (ropivacaine 0.5%) the mean duration of analgesia was 640.50±150.24 minutes. In Group C (ropivacaine 0.5% with clonidine) the mean duration of analgesia was 984.00±120.6 minutes. On comparing Group C with Group B the mean duration of analgesia is statistically highly significant (p value <.001). On comparing group C with group A the mean duration of analgesia in group C is statistically highly significant.

MEAN DURATION OF ANALGESIA



3. Visual Analogue Scale-Post operative:

PACU Time(hrs)	Group						P-value
	Group A		Group B		Group C		
	Mean	SD	Mean	SD	Mean	SD	
O	5.85	2.03	1.85	.67	1.00	.22	<.001**
½ hr	2.15	.93	1.90	.64	1.00	.22	<.001**
1hr	2.25	.97	2.10	.45	1.00	.00	<.02*
2hrs	2.70	1.26	2.30	.47	1.05	.22	<.001**
4hrs	2.95	.60	2.95	.60	1.15	.37	<.001*
6hrs	3.70	.57	3.20	.83	2.10	.85	<.001**
10hrs	4.45	.51	3.75	1.12	2.75	1.07	<.001**
14hrs	3.60	1.43	3.05	.39	2.35	1.36	<.001**
18hrs	3.75	.91	3.45	.60	2.35	1.85	<.001**
22hrs	3.75	.44	2.75	.55	1.80	.41	<.001**
24hrs	3.95	.22	2.90	.45	2.00	.32	<.001**

*-Significant

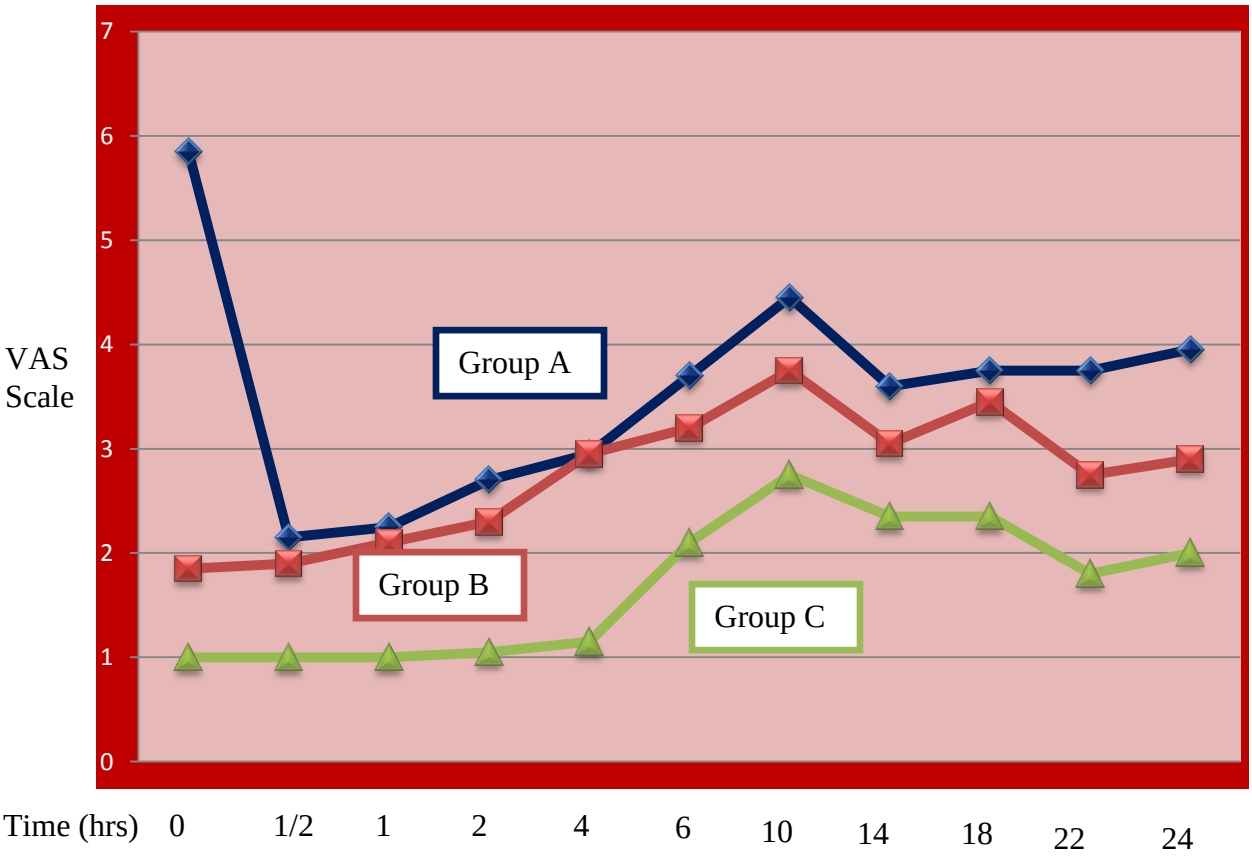
**- highly significant

	Group			P-value
	Group A(n=20)	Group B(n=20)	Group C(n=20)	
	Median	Median	Median	
At PACU VAS	6.5	2	1	0.001**

During postoperative period, the pain score was analyzed with Visual analogue scale. On comparing Group B and Group C with Group A, VAS pain score was less in Group B and Group C. The pain score was still lesser

in Group C compared to Group B. The p-values are statistically highly significant between the groups. At admission into PACU the mean pain score in Group A was 5.85± 2.03 , Group B was 1.85±0.67 and in Group C was 1±0.22.

Visual Analogue Scale



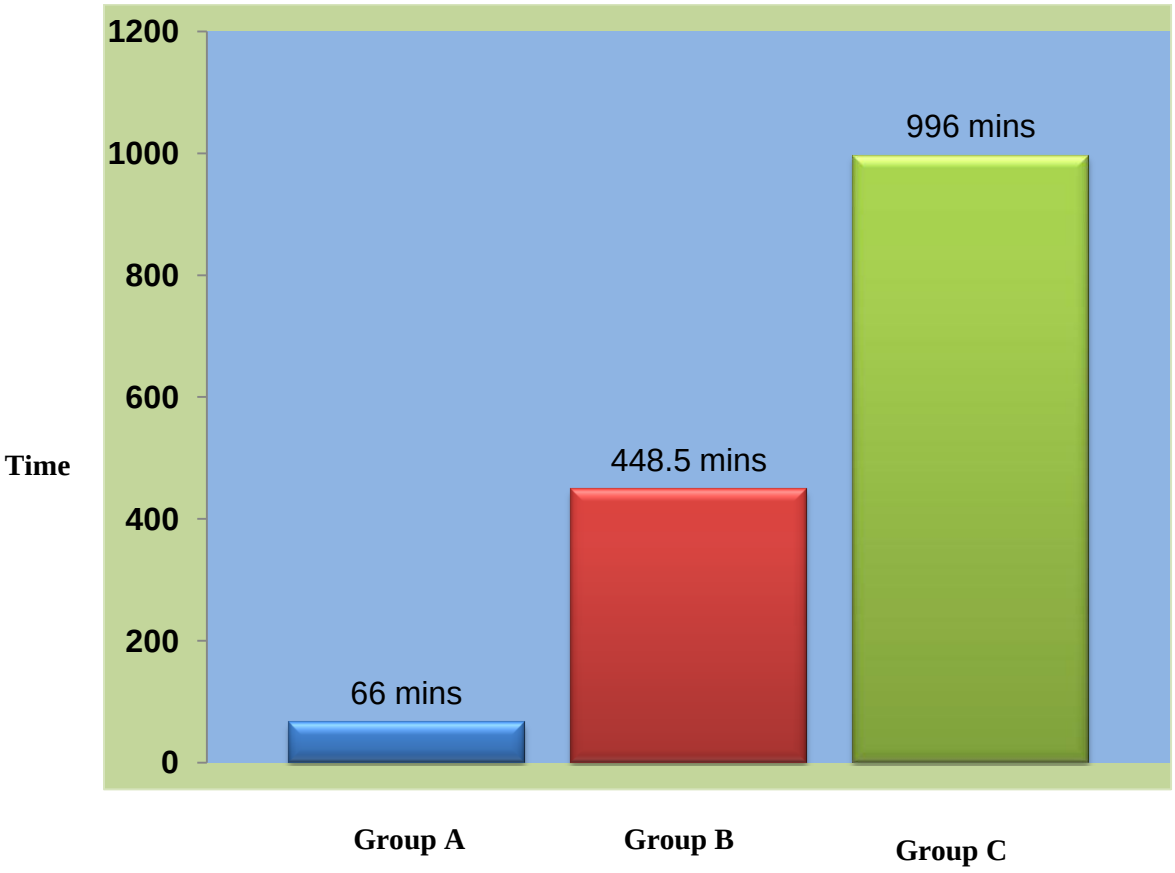
4. Time of Rescue analgesia:

	Group			
	Group A(n=20)	Group B(n=20)	Group C(n=20)	
	Mean ± SD	Mean ± SD	Mean±SD	P-value
1.time of 1st Rescue(mins)	66.00±58.88	448.50±127.83	996.00±140.91	<.001
2.Time of 2nd Rescue(mins)	768.00±157.67	-	-	

**- highly significant

The mean time of first rescue analgesia in group A was 66.00±58.88, Group B was 448.50±127.83 and in group C was 996.00±140.91. The requirement of rescue analgesia in Group A was early in the post operative period when compared to Group B and Group C which is statistically significant. The time of first rescue analgesia was early in group B when compared to group C.

Time of Rescue analgesia



5. Intra operative Fentanyl dosage:

	Group						
	Group A		Group B		Group C		
	Mean	SD	Mean	SD	Mean	SD	
Fentanyl	133.00	13.42	100.00	.00	100.00	.00	<.001**

**- highly significant

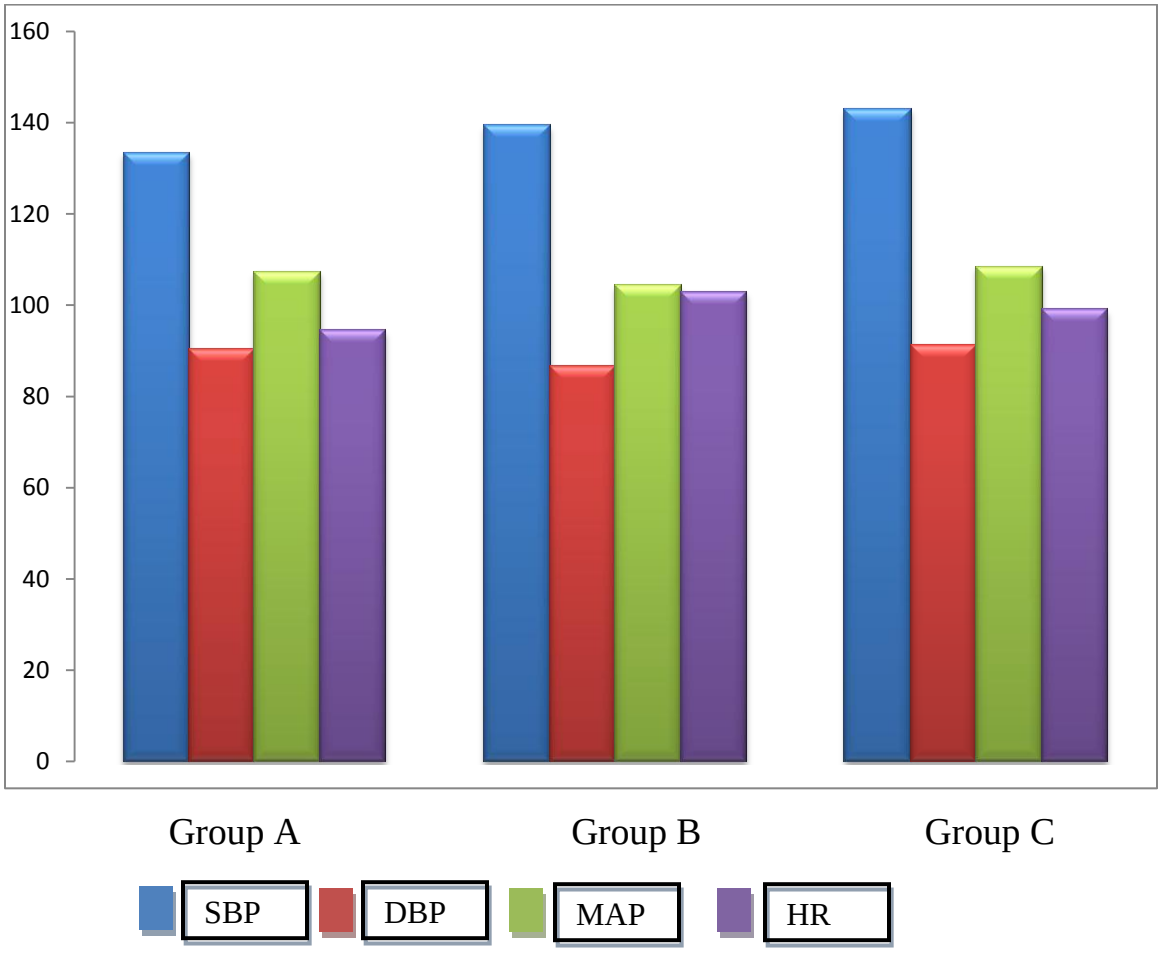
The dosage of fentanyl for Group B and Group C was less than Group A which is statistically highly significant. The dosage of fentanyl in group B and group C were same.

6. Haemodynamics:

a) Pre operative haemodynamics:

		Group						
		Group A		Group B		Group C		
		Mean	SD	Mean	SD	Mean	SD	P value
Baseline	SBP	133.40	31.92	139.45	18.33	143.50	8.60	.345
	DBP	90.25	8.53	86.60	9.66	91.20	5.94	.182
	MAP	107.30	9.39	104.35	10.70	108.40	6.72	.353
	HR	94.35	24.23	102.90	14.18	98.95	9.73	.296

BASELINE Haemodynamics



At baseline level, no significant difference in the Systolic blood pressure (SBP), Diastolic blood pressure (DBP), mean arterial pressure (MAP) and heart rate (HR) between the three groups was found.

b) Haemodynamic status at induction:

		Group						P value
		Group A		Group B		Group C		
		Mean	SD	Mean	SD	Mean	SD	
Induction	SBP	136.75	18.50	124.35	12.95	123.55	7.23	.005*
	DBP	89.40	12.47	80.15	7.98	83.90	4.92	.008*
	MAP	105.05	14.15	94.20	9.68	97.05	4.84	.004*
	HR	102.20	13.84	91.05	11.81	87.55	6.95	<.001**

***-** significant

****-** highly significant

During induction period the difference in the Systolic blood pressure (SBP), Mean arterial pressure (MAP) and heart rate (HR) at induction and difference in the heart rate is highly significant between the three groups.

c) Haemodynamic status at the incision time:

		Group						P-value
		Group A		Group B		Group C		
		Mean	SD	Mean	SD	Mean	SD	
Incision	SBP	123.75	16.25	112.35	10.90	113.85	7.18	.08
	DBP	84.80	12.87	76.60	7.46	79.65	6.86	.027*
	MAP	96.70	13.52	89.85	8.48	89.55	7.27	.49
	HR	91.15	23.68	80.85	9.15	75.90	7.67	.09

*-significant

At the incision time the difference in the Systolic blood pressure (SBP), Diastolic blood pressure (DBP) and heart rate (HR) are statistically significant between the three groups.

d) Haemodynamic status at the end of the procedure:

		Group						P-value
		Group A		Group B		Group C		
		Mean	SD	Mean	SD	Mean	SD	
End of procedure	SBP	135.20	11.45	118.45	9.19	115.15	10.06	<.001**
	DBP	89.10	8.81	79.50	8.92	80.65	7.04	.01*
	MAP	103.60	9.38	91.95	8.40	91.95	7.87	<.001**
	HR	89.50	16.10	75.85	9.89	71.55	8.50	<.001**

***-** significant

****-** highly significant

At the end of the procedure the difference in the Systolic blood pressure (SBP), Diastolic blood pressure (DBP), mean arterial pressure (MAP) and heart rate (HR) are significant between the three groups.

e) Haemodynamics during extubation:

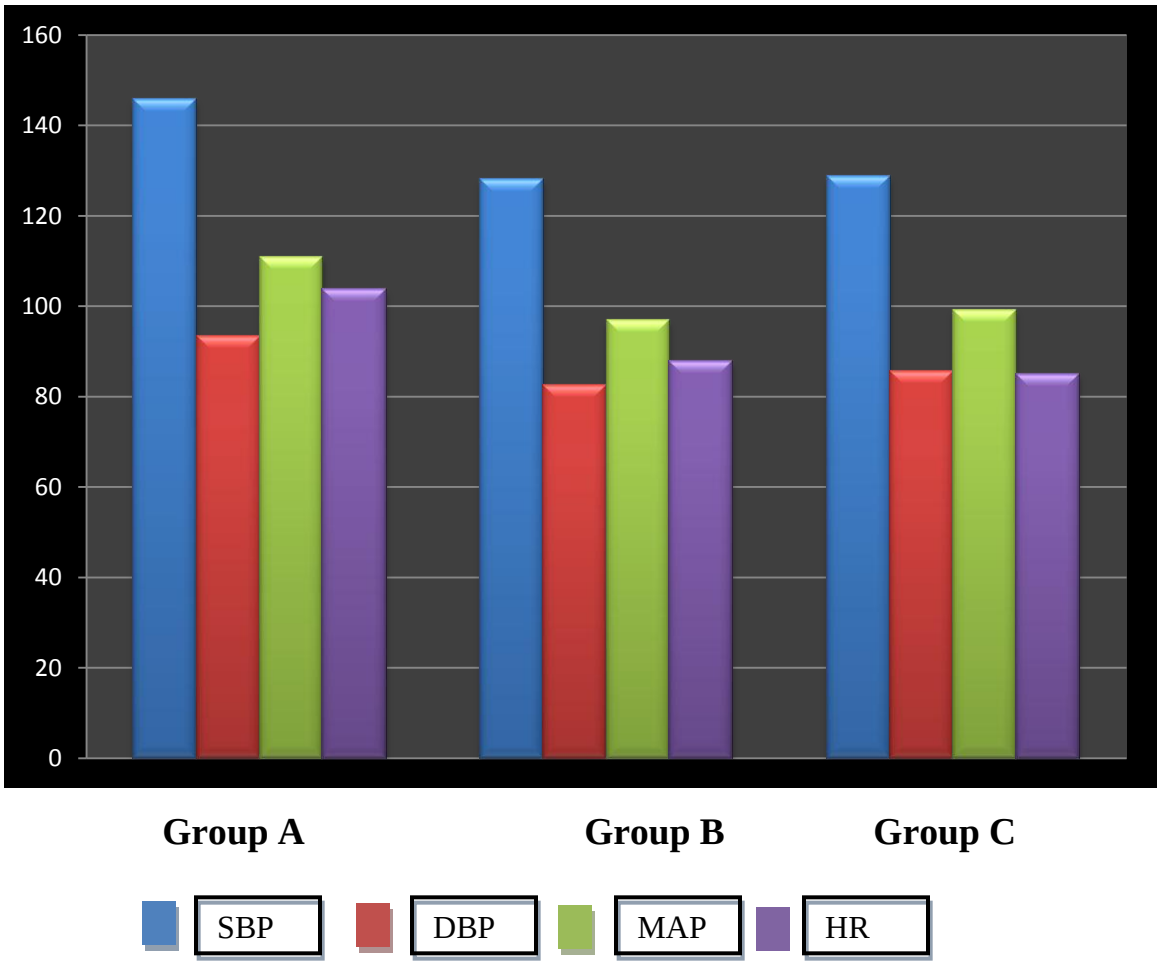
		Group						P-value
		Group A		Group B		Group C		
		Mean	SD	Mean	SD	Mean	SD	
Extubation	SBP	145.75	11.45	128.00	8.90	128.60	6.62	<.001**
	DBP	93.45	6.95	82.65	9.15	85.65	6.84	<.01*
	MAP	110.90	6.49	96.75	9.22	99.25	7.03	<.001**
	HR	103.70	12.12	87.75	7.95	85.05	7.53	<.01*

*-significant

**- highly significant

At extubation the difference in the Systolic blood pressure (SBP), Diastolic blood pressure (DBP), mean arterial pressure (MAP) and heart rate (HR) are statistically significant between the three groups.

Haemodynamics during extubation



4. **Intra operative Haemodynamics:**

a) Systolic blood pressure:

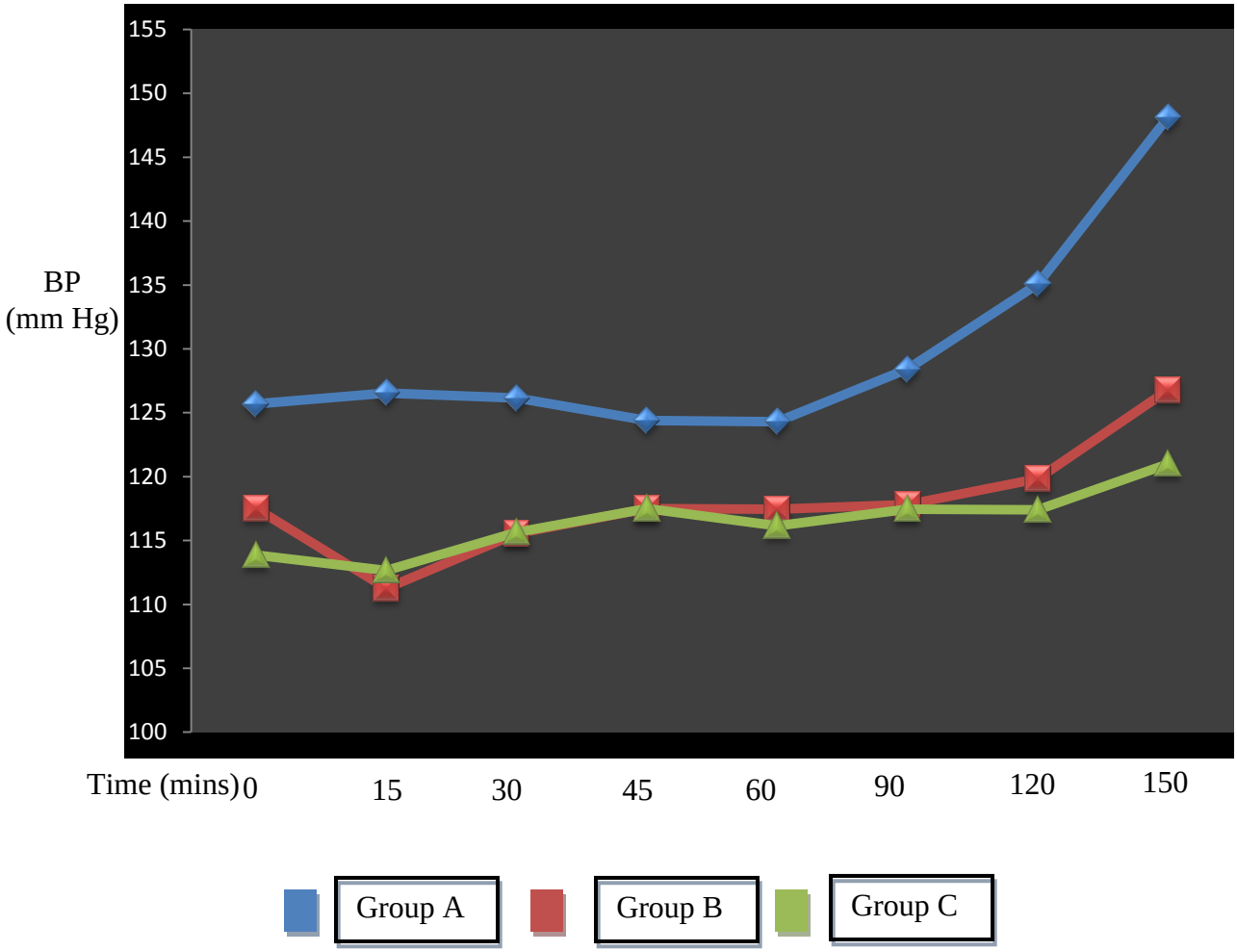
	Group						
	Group A		Group B		Group C		
Time(mins)	Mean	SD	Mean	SD	Mean	SD	P-value
0	125.70	17.42	117.50	9.38	113.85	7.18	.010*
15	126.55	17.80	111.25	10.96	112.65	8.86	.001*
30	126.15	14.24	115.55	10.98	115.65	8.49	.006*
45	124.40	11.55	117.50	10.99	117.50	8.58	.063
60	124.30	10.67	117.45	10.98	116.15	7.82	.026*
90	128.41	13.58	117.80	8.16	117.45	9.57	.003*
120	135.07	14.50	119.84	9.97	117.39	10.21	< .001**
150	148.13	9.49	126.77	6.66	121.00	10.09	< .001**

***-** significant

****-** highly significant

During intra operative period, Systolic blood pressure was lower in group B and Group C than Group A. At 15^{th} minutes, 90^{th} minutes, 120^{th} minutes and 150^{th} minutes the differences were statistically significant between the three groups. All systolic BP values are well above 110mm Hg in both group B and group C.

Systolic Blood Pressure



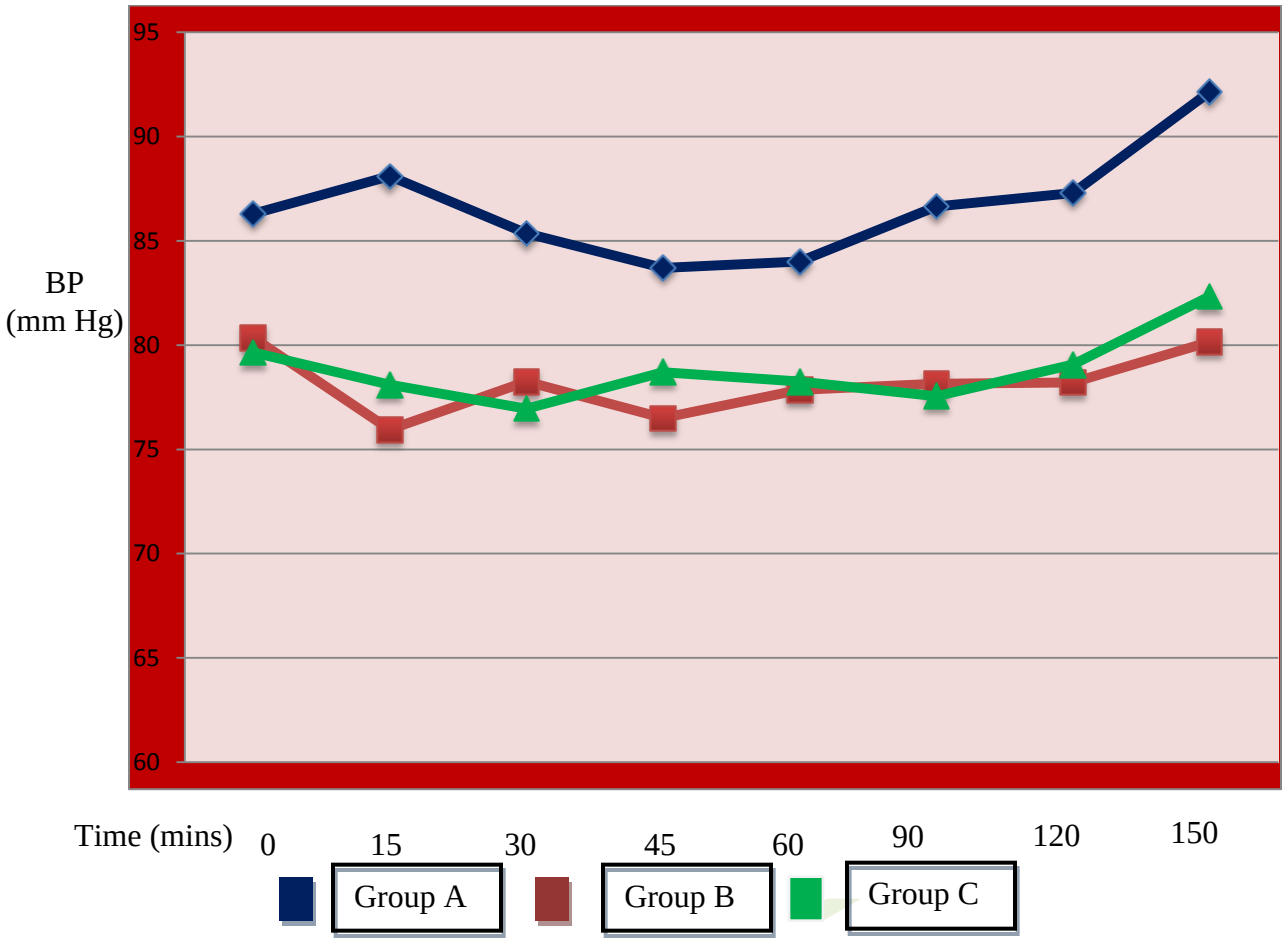
b) Diastolic blood pressure:

	Group						
	Group A		Group B		Group C		
Time(mins)	Mean	SD	Mean	SD	Mean	SD	P-value
0	86.30	13.30	80.35	9.50	79.65	6.86	.087
15	88.10	14.99	75.95	7.44	78.10	8.12	.002*
30	85.35	10.86	78.25	7.14	76.95	9.35	.012*
45	83.70	7.36	76.50	8.97	78.70	8.50	.025
60	84.00	7.13	77.85	7.41	78.25	7.08	.015*
90	86.65	9.84	78.15	6.59	77.55	9.64	.004*
120	87.29	8.06	78.21	6.54	79.06	7.60	.002*
150	92.13	5.62	80.15	8.38	82.33	9.24	.008*

***-** significant

Diastolic blood pressure was comparatively lower in Group B and Group C than Group A. The differences were statistically significant at 15^{th} minutes, 90th minutes and 120^{th} minutes between the three groups.

DIASTOLIC BLOOD PRESSURE



c) Mean arterial pressure:

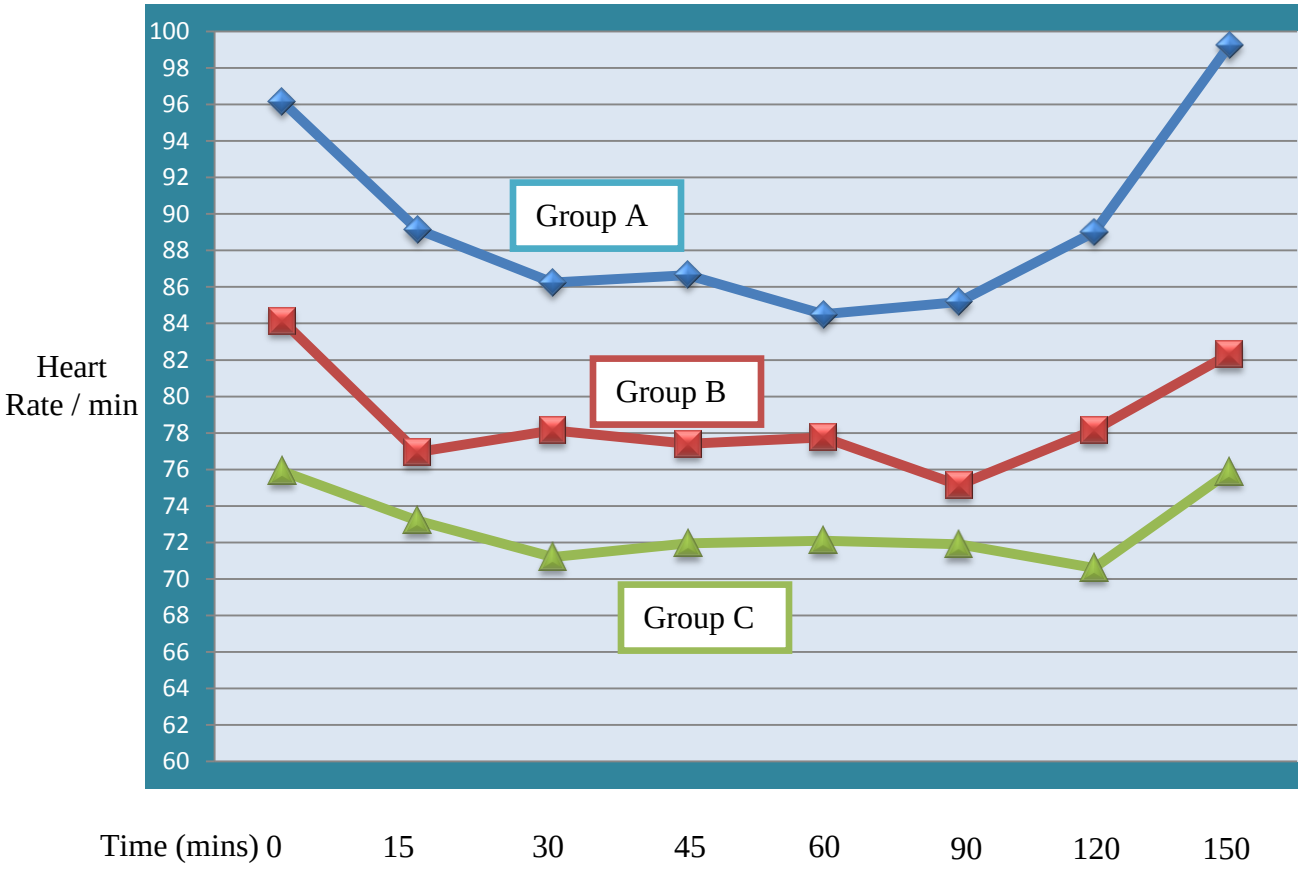
	Group						
	Group A		Group B		Group C		
Time(mins)	Mean	SD	Mean	SD	Mean	SD	P-value
0	98.40	13.55	91.55	8.03	89.55	7.27	.018*
15	100.70	15.77	86.95	8.59	89.55	8.62	.001*
30	97.75	12.56	90.30	8.05	88.85	10.01	.019*
45	97.25	8.87	89.90	9.06	91.40	8.92	.029*
60	97.15	7.75	90.45	7.78	90.50	7.51	.010*
90	100.83	8.77	91.00	5.88	91.65	8.04	<.001**
120	103.29	9.38	91.42	7.29	91.33	8.32	<.001**
150	110.63	6.41	94.92	7.83	94.80	9.33	<.001**

***-** significant

****-** highly significant

Mean arterial pressure was comparatively lower in group B and Group C than Group A. The p-values at 15th, 90th, 120th and 150th minutes were statistically significant between the three groups. All MAP values are well above 80 mm Hg in both group B and group C.

Heart rate


Heart Rate / min
100
98
96
94
92
90
88
86
84
82
80
78
76
74
72
70
68
66
64
62
60
Group A
Group B
Group C
Time (mins) 0
15
30
45
60
90
120
150

7. Post operative Haemodynamics:

d) Heart rate:

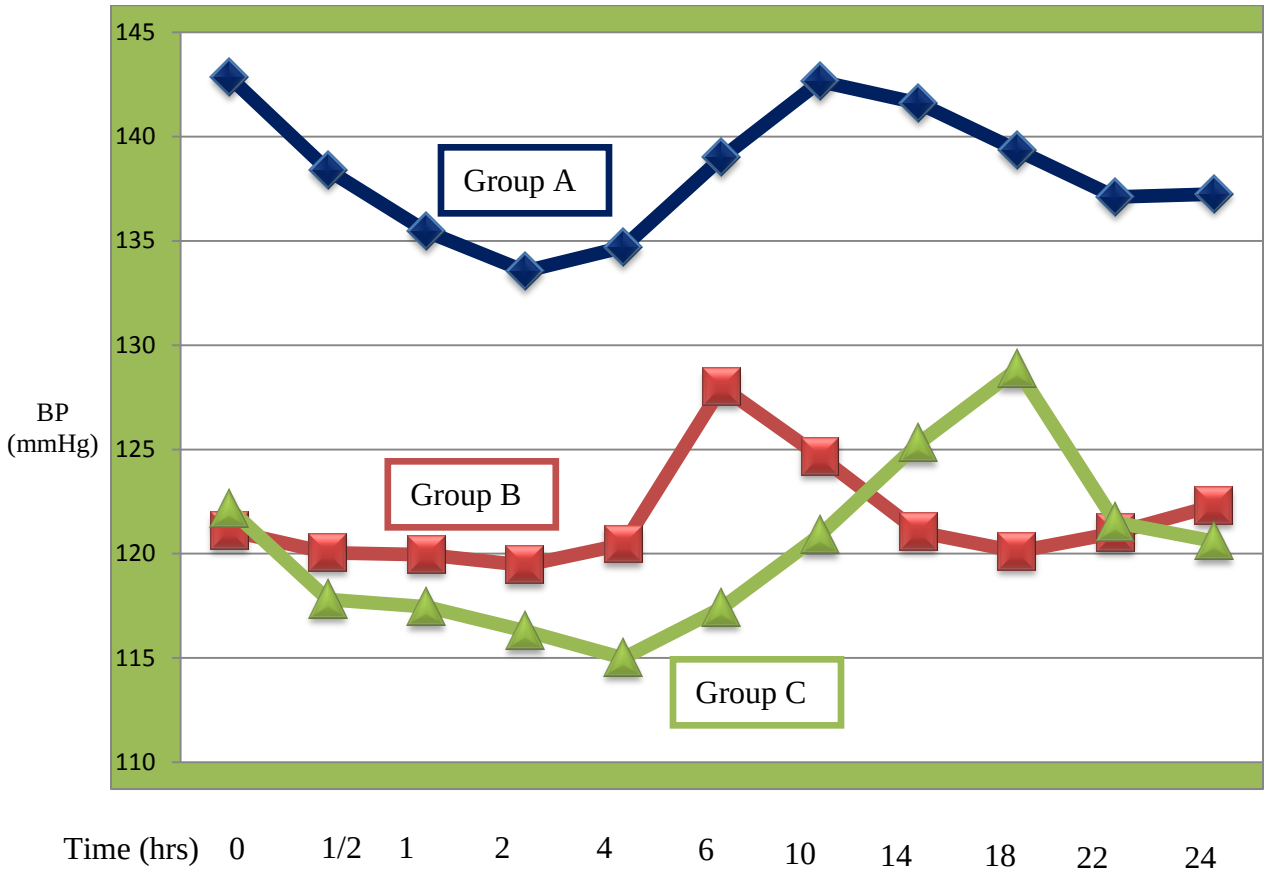
	Group						
	Group A		Group B		Group C		
Time(mins)	Mean	SD	Mean	SD	Mean	SD	P-value
0	96.15	15.08	84.15	11.35	75.90	7.67	<.001**
15	89.15	14.89	76.95	8.22	73.20	7.69	<.001**
30	86.25	17.25	78.15	8.42	71.20	7.70	.01*
45	86.65	18.28	77.40	7.43	71.95	8.65	.02*
60	84.50	18.46	77.75	9.61	72.10	8.47	.014
90	85.18	16.85	75.15	8.40	71.90	8.91	.03*
120	89.00	15.04	78.16	8.86	70.61	8.32	<.001**
150	99.25	24.83	82.31	9.18	75.87	9.43	.02*

***-** significant

****-** highly significant

In comparison to Group A, Heart rate is lower in Group B and Group C. The differences in heart rate during intra operative period were statistically significant between the three groups.

Systolic blood pressure



a) Systolic blood pressure:

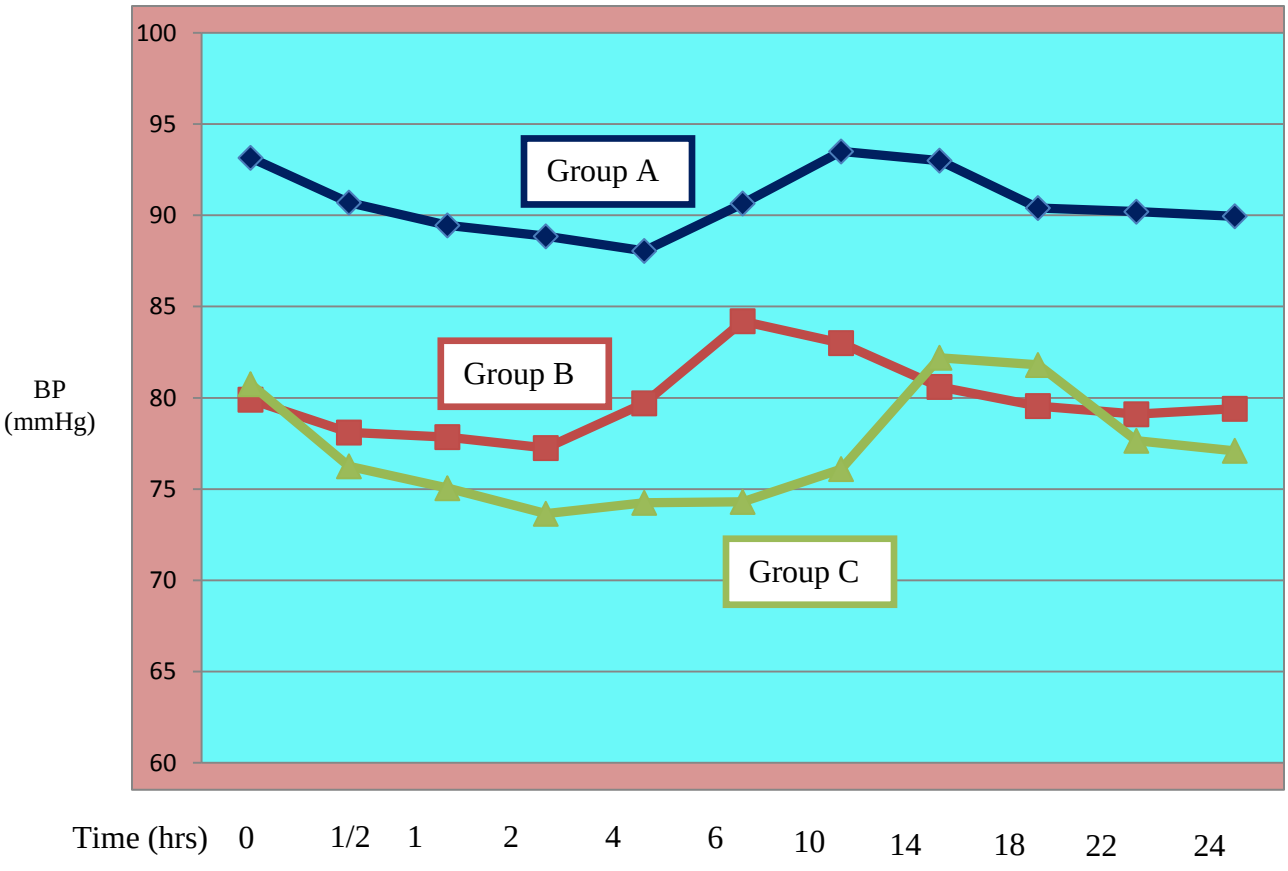
	Group						
	Group A		Group B		Group C		
time	Mean	SD	Mean	SD	Mean	SD	P-value
O minute	142.85	8.53	121.10	6.77	122.15	7.61	<.001**
½ hr	138.40	7.82	120.05	4.78	117.80	7.60	<.01*
1hr	135.45	8.33	119.95	6.49	117.45	8.67	<.001**
2hrs	133.55	8.76	119.45	5.64	116.30	6.63	<.001**
4hrs	134.70	10.28	120.45	5.33	115.00	5.90	<.001**
6hrs	139.00	7.68	128.00	7.23	117.40	9.21	<.02*
10hrs	142.65	8.07	124.65	8.76	120.90	8.93	<.001**
14hrs	141.60	8.25	121.05	5.23	125.30	11.02	<.03*
18hrs	139.35	8.36	120.10	5.06	128.85	7.84	<.001**
22hrs	137.10	9.22	121.00	5.51	121.50	5.24	<.04*
24hrs	137.25	9.05	122.30	5.38	120.60	4.45	<.001**

***-** significant

****-** highly significant

During post operative period, Systolic blood pressure was lower in group B and Group C than Group A. The differences are statistically significant between the three groups. All systolic BP values are well above 110mm Hg in both group B and group C.

Diastolic blood pressure



b) Diastolic blood pressure:

	Group						
	Group A		Group B		Group C		
time	Mean	SD	Mean	SD	Mean	SD	P-value
O minute	93.15	4.88	79.90	6.58	80.75	7.23	<.001**
½ hr	90.70	4.66	78.10	5.64	76.25	7.38	<.02*
1hr	89.45	6.88	77.85	5.78	75.05	7.86	<.001**
2hrs	88.85	6.41	77.25	5.06	73.65	6.66	<.001**
4hrs	88.05	7.01	79.70	5.92	74.25	5.72	<.03*
6hrs	90.65	5.25	84.20	6.45	74.30	6.50	<.001**
10hrs	93.50	5.82	83.00	7.38	76.10	6.61	<.001**
14hrs	93.00	5.40	80.60	5.94	82.20	9.16	<.04*
18hrs	90.40	5.45	79.55	5.73	81.80	8.98	<.001**
22hrs	90.20	5.38	79.10	6.06	77.65	6.16	<.001**
24hrs	89.95	4.87	79.40	6.40	77.10	5.84	<.001**

***-** significant

****-** highly significant

During post operative period, Diastolic blood pressure was lower in group B and Group C than Group A. The differences are statistically significant between the three groups.

C) Mean Arterial Pressure:

	Group						
	Group A		Group B		Group C		
time	Mean	SD	Mean	SD	Mean	SD	P-value
O minute	109.80	4.67	93.75	4.99	94.05	6.53	<.001**
½ hr	106.60	4.15	92.05	4.55	89.65	7.05	<.03*
1hr	104.80	6.06	91.25	4.59	89.05	7.52	<.001**
2hrs	103.70	6.36	91.40	4.76	87.70	6.84	<.001**
4hrs	103.60	6.81	93.25	4.79	87.80	5.69	<.02*
6hrs	106.70	4.54	98.80	5.75	88.65	6.89	<.001**
10hrs	109.80	5.53	96.90	6.65	91.15	6.78	<.001**
14hrs	109.15	4.63	94.00	4.96	97.00	10.11	<.001**
18hrs	106.75	4.85	92.85	4.93	97.50	7.87	<.03*
22hrs	105.95	5.53	93.15	5.23	92.15	4.67	<.001**
24hrs	105.75	5.53	93.55	5.52	92.25	4.48	<.001**

***-** significant

****-** highly significant

During post operative period, Mean arterial pressure was lower in group B and Group C than Group A. The differences are statistically significant between the three groups. All MAP values are well above 80mm Hg in both group B and group C.

d) Heart rate:

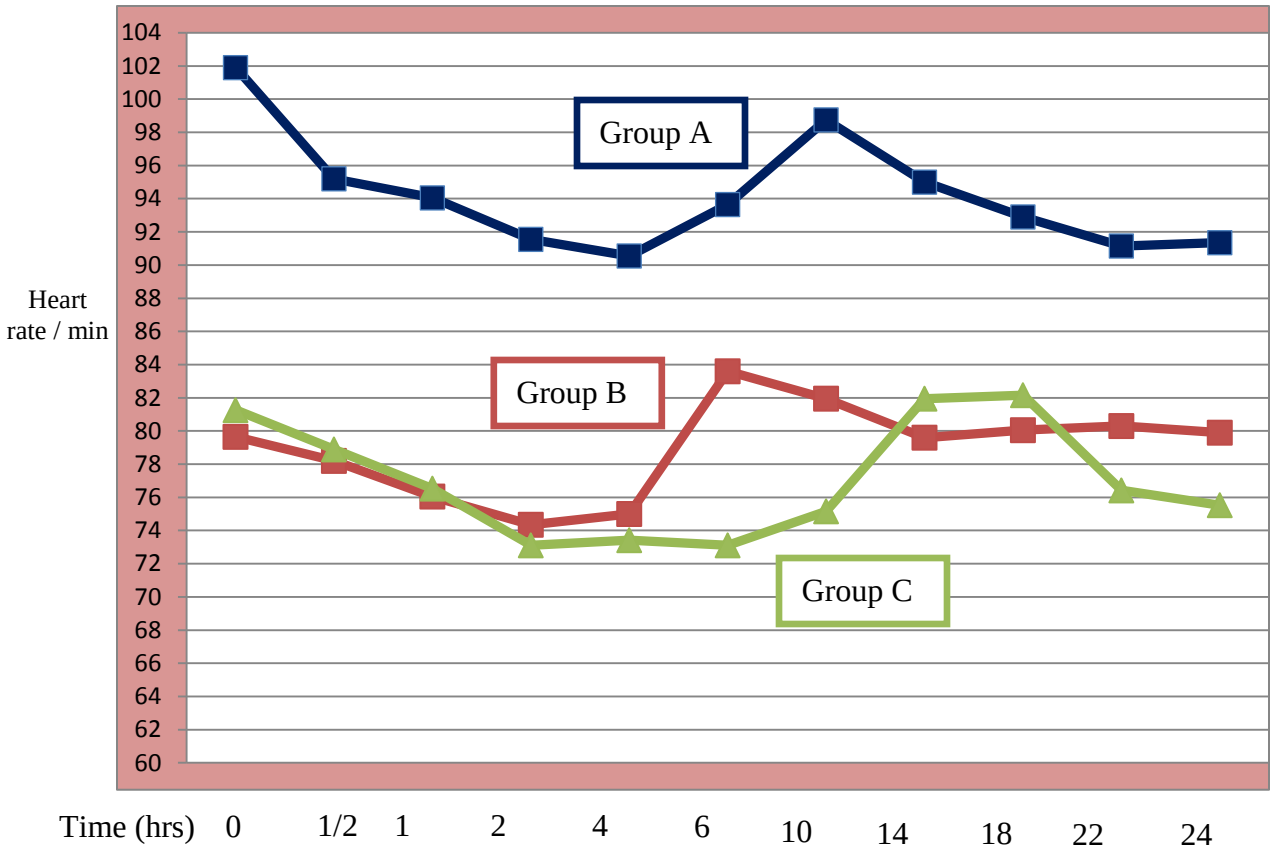
	Group						
	Group A		Group B		Group C		
time	Mean	SD	Mean	SD	Mean	SD	P-value
O minute	101.90	10.75	79.65	7.94	81.26	7.29	<.001**
½ hr	95.20	9.27	78.20	6.82	78.89	6.01	<.04*
1hr	94.05	8.00	76.05	6.69	76.53	6.53	<.001**
2hrs	91.55	5.87	74.35	6.58	73.11	7.42	<.001**
4hrs	90.55	6.73	75.00	6.91	73.42	6.89	<.001**
6hrs	93.65	6.47	83.60	9.17	73.11	6.76	<.02*
10hrs	98.75	7.81	81.95	7.71	75.16	7.62	<.001**
14hrs	95.00	9.52	79.60	5.23	81.95	9.61	<.02*
18hrs	92.90	5.81	80.05	4.35	82.16	8.06	<.001**
22hrs	91.15	5.67	80.30	5.82	76.42	4.96	<.001**
24hrs	91.35	6.12	79.90	5.24	75.53	4.14	<.03*

***-** significant

****-** highly significant

During post operative period, Heart rate was lower in group B and Group C than Group A the differences are statistically significant between the three groups.

HEART RATE


Heart rate / min
104
102
100
98
96
94
92
90
88
86
84
82
80
78
76
74
72
70
68
66
64
62
60
Group A
Group B
Group C
Time (hrs)
0
1/2
1
2
4
6
10
14
18
22
24

SIDE EFFECTS:

	Group A	Group B	Group C
PONV	7(35%)	1(5%)	1(5%)
Hypotension	-	-	-
Bradycardia	-	-	1(5%)
Sedation	-	-	2(10%)

In group A seven patients had nausea and vomiting post operatively whereas only one patient had PONV in group B and Group C. In group C one patient developed braycardia which was treated with injection atropine and two patients had mild sedation.

DISCUSSION

Post thyroidectomy pain has many components which are related to the superficial and deep layers of the wound, wound drainage and neck position during the intra operative period. In different types of surgery local anaesthetics have been used as an infiltrating agent for post operative pain relief, but results were disappointing in procedures like Gynecological surgery, major visceral surgery and cervical spine surgery because of the short duration of action of local anaesthetics.

The demographic profile of our patients was comparable in all three groups with respect to mean age, BMI, ASA Physical status. There is no difference in the duration of surgery among the three groups.

DURATION OF ANALGESIA:

The results of the study showed that, BSCPB performed by three point technique before general anaesthesia using injection ropivacaine 0.5% (group B) and ropivacaine0.5% with clonidine 2mcg/kg (Group C) resulted in significant increase in the duration of post operative analgesia and reduction in other post operative analgesic requirements. The addition of adjuvant clonidine 2mcg/kg to ropivacaine 0.5% prolongs the duration of post operative analgesia more than using ropivacaine 0.5% alone. An

adjuvant clonidine with ropivacaine enhances pain relief after superficial cervical plexus block via central action through systemic absorption and direct action is mainly because of local nerve fibres involvement.

In a study by **Aunac S, Carlier M**[11]**,** reported a reduction in analgesic requirement with BSCPB during intra operative and post operative periods for patients undergoing thyroidectomy under general anaesthesia done with 0.5% ropivacaine and 0.5% ropivacaine with clonidine. During surgery, the requirement of additional alfentanil boluses was reduced significantly in Groups 2 and 3 compared with Group 1. After surgery, the opioid and NSAID analgesic requirements were also significantly reduced in Groups 2 and 3 during the first 24 h. This correlates with the finding in our study.

Susmita Chakra borty et al[41] evaluated the effect of adjuvant clonidine with bupivacaine-induced supraclavicular brachial plexus block. They concluded that addition of a small dose of clonidine to 0.5% bupivacaine significantly prolonged the duration of analgesia without producing any clinically important adverse reactions other than sedation.

In our study also the addition of clonidine with ropivacaine significantly prolonged the duration of analgesia (984$\pm$120.63 mins) when compared to control group (66$\pm$58.8 mins)

El Saied AH, Steyn MP, Ansermino JM[44]

The clonidine patients showed an increase in duration of sensory loss from 489 min to 628 min with a mean difference of 138 min and analgesia from 587 min to 828 min with mean difference of 241 min. There was no difference in onset time. No side effects were noted.

The adjuvant of 150 microgram of clonidine to ropivacaine, for brachial plexus blockade, prolongs motor and sensory block and analgesia, without side effects.

In our study, the addition of clonidine with ropivacaine increases the duration of analgesia in group C 984±120 mins and in group A was 66± 58 mins

In a study by **Herbland and colleagues** [8]**,** BSCPB performed by two point injection with ropivacaine 0.75% administered before surgery without any adjuvant. As a consequence, in the post operative period the BSCPB may have receded rapidly, even though the duration of post operative analgesia is longer than local anaesthetic infiltration and control group.

In our study since we used clonidine as an adjuvant, duration of post operative analgesia is longer than Group B and control group.

PAIN SCORE:

The VAS scores in group A confirm that after surgery, some patients experience severe pain after admission into PACU. The mean visual analogue scale for group B(1.85± 0.67)and group C(1.00±0.22) was lower than group A(5.85± 2.03).On comparing with group B, group C had less mean visual analogue scale.After thyroidectomy, the initial post operative period is very important for pain management. Acetaminophen alone is insufficient.

In a study by Andrieu et al [34], At PACU admission, pain scores were lower in Group R (Ropivacaine) median range 3 and RC (ropivacaine with clonidine) is median 3(0-8) than in Group P (control) 5(0–8) .Pain score is reduced in all three groups during first 24 h after surgery.

In our study Pain scores were lower in group C (ropivacaine with clonidine) with median 1 and Group B (ropivacaine alone) was median 2 when compared to group A (control) median 6.5.

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At admission to PACU, patients given BSCBs had significantly lower VAS score than control group with mean 47 ± 19, 27 ± 17 mm respectively (p= 0.002).

This is comparable with our study, where mean VAS in group C was 1.00±0.22 and in group A was 5.85±2.03.

Isaak Kesisoglou, MD, PhD, et al [50]

This study in 100 patients undergoing total thyroidectomy evaluated the effects of BSCPB done with 20ml of 0.75% ropivacaine. Additional parecoxib was administrated immediately postoperatively and 12 hours later. Postoperative pain was assessed by VAS. All parameters were recorded at 0, 3, 6, 9, 12, and 24 hours after surgery. They concluded that two-point bilateral BSCPB has a major analgesic effect on patients after total thyroidectomy, with a significant statistical reduction in postoperative pain scores.

In our study we also recorded all the parameters up to 24 hours post operatively. There was significant reduction in pain scores in patients whom BSCPB was performed (three point technique).

Rescue analgesia:

The group C and group B showed comparatively good results over group A in various characteristics like prolonged post operative analgesia and a decreased amount of rescue analgesia used post operatively. The mean time

for first rescue analgesia was longer in Group C (996.00±140.91 minutes) and Group B (448.50±127.83) when compared to Group A (66.00±58.88minutes).There was no second rescue in Group B and group C.

The total analgesic requirement in group C was less when compared to group A. On comparing with Group B with Group C decreased the analgesic requirements were same post operatively.

In a study by Andrieu et al[34], Nefopam need during the first 24 h after thyroidectomy were significantly reduced in Group R (ropivacaine) and RC(ropivacaine with clonidine) compared with Group P(control) , but no difference was observed between R and RC.

In our study the analgesic requirements in group C and group B were significantly reduced when compared to group A. There was no second rescue in group C and group B.

In study by Hisham Negmi MD, et al,

In PACU the morphine consumption was significantly higher in control group compared to BSCBs group with mean 10.36 ± 6.7, 3.16 ± 5.85 mg respectively. Eighteen Patients in control group (72%) received morphine in PACU compared to 6 patients in BSCBs group (24%).

In our study we used Inj. Diclofenac sodium as rescue analgesia .In group A 14 patients (70%) required first rescue at the time of admission into PACU and none of the patient in group B and group C required rescue immediately. The total rescue dosage was higher in group A when compared to group B and group C.

Hemodynamic stability:

Vital signs remained stable throughout the intraoperative and post operative period, which confirms the established effects of α-2 agonists-clonidine in providing hemodynamically stability. Although a slight decrease in heart rate and blood pressure (both systolic and diastolic) was observed in the group C, it never fell down to more than 20% of baseline values.

G. Andrieu et al [34] in their study showed that systolic blood pressure was significantly lower in ropivacaine plus clonidine Group compared with ropivacaine only group at the end of resection and at extubation. The maximum reduction in systolic blood pressure compared with induction was 28% for ropivacaine plus clonidine Group and 24% for ropivacaine only group.

In our study there was significant reduction in systolic blood pressure, Diastolic blood pressure and heart rate during induction, extubation and throughout the intra and post operative period.

Total Fentanyl Dosage:

Total fentanyl dosage during intraoperative period is less in group B and Group C. Because of increased intra operative opioid usage in group A, some of the patients had post operative vomiting and sedation. By using regional anaesthesia technique like BSCPB, we can overcome this problem

In a study by **Andrieu et al** [34], where BSCPB was performed for thyroidectomy the intra operative total fentanyl dosage reduced significantly in Group RC compared with Groups P and R.

In our study the total fentanyl requirements significantly higher for control group when compared to BSCPB group.

Hisham Negmi MD, et al

Intraoperative fentanyl requirements were significantly higher in control group compared to BSCBs group with mean165 ± 51, 67.4 ± 17.8 mcg respectively.

In our study also the total intra operative fentanyl dosage were significantly higher in control group (133 ± 13.42)when compared with BSCPB group (100.00)

Rita Pal et al [35] studied the quality and duration of postoperative analgesia by cervical plexus block using bupivacaine and clonidine. Duration of analgesia was significantly more in bupivacaine plus clonidine group (8.19 ± 3.2 hour) as compared to bupivacaine group (5.24 ±1.6 hours). Total consumption of fentanyl citrate in postoperative period was also significantly less in the bupivacaine plus clonidine group.

In our study also the total intra operative fentanyl dosage were significantly higher in control group(133 ± 13.42)when compared with BSCPB group (100.00)

SEDATION SCORE:

The results of our study showed that Ramsay sedation score in all the three groups are similar except in Group C, two patients had RSS of 3. Sedation in Group C is due to the effect of Clonidine.

Andrea Casati et al [43] demonstrated that, when providing combined sciatic-femoral nerve block for hallux valgus repair, the addition of 1 μg/kg clonidine to 0.75% ropivacaine prolongs the duration of postoperative

analgesia by 3 h, with only a slight and short-lived increase in the degree of sedation and no hemodynamic adverse effects.

In our study two patients (10%) in group C had sedation without any adverse effects.

SIDE EFFECTS:

In group A seven patients had nausea and vomiting post operatively whereas one patient had PONV in group B and Group C. This correlates with higher dose of Fentanyl in Group A

In a study by Andrieu et al [34] patients (36%) developed PONV, 8 patients in Group P (control), 14 patients in Group R(ropivacaine), and 9 patients in Group RC (ropivacaine with clonidine).

In contrast, in our study 35% of patients in the group A (control) and one patient in group (ropivacaine) and group C (ropivacaine with clonidine) had vomiting.

Andrea Casati et al [43] demonstrated that prolonged duration of analgesia with the addition of clonidine 1mcg/kg with ropivacaine 0.75%, when providing combined sciatic-femoral nerve block for hallux valgus

repair, with no hemodynamic adverse effects and mild increase in degree of sedation.

In our study two patients (10%) in group C had sedation without any adverse effects.

SUMMARY

1. Duration of Analgesia:

BSCPB performed by three point technique before general anaesthesia resulted in significant increase in the duration of post operative analgesia and reduction in other post operative analgesic requirements. The addition of adjuvant clonidine 2mcg/kg to ropivacaine 0.5% prolongs the duration of post operative analgesia more than using ropivacaine 0.5% alone.

2. Pain Score:

At admission into PACU, the median VAS score is less in BSCPB patients. The pain score was still lesser in patients who received ropivacaine with clonidine.

3. Rescue analgesia:

Post operative analgesic requirements were significantly reduced in BSCPB group.

4. Total Fentanyl dosage:

There was significant reduction in intra operative fentanyl dosage in BSCPB groups.

5. Haemodynamic status:

There was reduction in Systolic blood pressure, Mean arterial pressure and Heart rate during intra and post operative period and it never fell down <20% of baseline value.

6. Side effects:

There was significant reduction in Post operative nausea and vomiting in BSCPB groups.

CONCLUSION

Bilateral Superficial cervical plexus block performed prior to general anaethesia using ropivacaine 0.5% along with adjuvant clonidine 2mcg/kg had better post operative analgesic efficacy than ropivacaine alone in patients undergoing total thyroidectomy. It also reduces the intra operative opiates requirement, post operative rescue analgesia requirement and has lower VAS score with negligible side effects. From this study, we conclude that bilateral superficial cervical plexus block is an effective and useful method to manage post operative pain in patients undergoing total thyroidectomy.

S.No	Name	Age	sex	I.P.no	Ht	Wt	Group	Diagnosis	Name of surgery	Duration of surgery	Haemodynamics-Intraoperative																	
											Baseline				Induction				Incision				Endof the procedure				Extubation			
											SBP	DBP	MAP	HR	SBP	DBP	MAP	HR	SBP	DBP	MAP	HR	SBP	DBP	MAP	HR	SBP	DBP	MAP	HR
1	Malarkodi	39	F	31516	150	53	A	MNG	TT	135	142	81	101	96	143	82	102	90	148	85	106	89	150	78	102	98	158	92	114	115
2	Sundarammal	60	F	27118	152	50	A	MNG	TT	150	168	100	123	95	152	96	114	92	148	95	113	90	138	92	107	100	163	95	118	115
3	Jamuna	32	F	32536	154	49	A	MNG	TT	120	146	94	111	120	148	96	113	138	137	98	111	15	148	98	115	122	145	96	112	125
4	Poongavanam	38	F	32108	154	52	A	MNG	TT	130	125	84	97	85	120	80	93	88	102	70	80	74	138	82	101	82	153	98	116	108
5	Kuppammal	50	F	33609	158	55	A	MNG	TT	120	13	90	103	86	124	86	99	94	107	77	87	88	143	98	113	75	148	100	116	90
6	Selvarani	47	F	27135	147	32	A	MNG	TT	120	133	87	102	108	178	120	139	98	119	88	98	101	118	74	89	66	147	92	110	93
7	Sumathi	23	F	34823	151	54	A	MNG	TT	60	142	84	103	130	138	93	108	118	108	67	81	108	116	99	101	95	124	107	113	105
8	Rajakumari	45	F	28252	150	51	A	MNG	TT	115	151	96	114	111	143	93	110	95	121	82	95	100	141	89	106	103	139	87	104	102
9	Usha	39	F	29429	148	50	A	MNG	TT	105	144	111	122	103	108	73	85	102	128	95	106	105	138	94	109	76	144	97	113	113
10	Amulrani	24	F	32632	152	52	A	MNG	TT	120	103	69	80	83	106	67	80	100	106	67	80	92	128	86	100	90	131	80	97	95
11	Chinnaponnu	35	F	31536	155	50	A	MNG	TT	75	131	88	106	85	153	108	124	92	139	106	115	90	143	99	113	72	148	95	113	90
12	Malliga	50	F	30511	152	51	A	MNG	TT	150	166	93	117	85	156	92	113	92	148	93	111	82	153	98	116	56	163	95	117	98
13	Prasanna	23	F	34762	154	54	A	MNG	TT	95	143	86	105	97	140	93	109	103	109	78	88	68	127	87	100	76	131	91	108	108
14	Thilagavathy	30	F	31762	153	51	A	MNG	TT	75	150	90	110	121	140	86	104	130	100	66	77	141	123	82	86	88	130	80	96	85
15	Thangammal	35	F	30587	152	53	A	MNG	TT	90	140	98	116	85	150	99	116	88	121	81	90	82	138	97	111	92	142	97	111	95
16	Pounammal	45	F	31623	151	50	A	SNG	TT	150	121	98	107	108	123	71	88	116	136	112	120	98	146	102	118	102	153	106	121	118
17	Rani	32	F	30652	152	53	A	SNG	TT	100	125	87	106	88	117	89	98	95	118	87	97	90	119	82	94	87	136	91	106	84
18	Rani	23	F	27686	154	52	A	MNG	TT	150	146	92	110	106	148	96	113	110	138	91	107	106	119	75	90	100	148	90	109	121
19	Manikandan	26	M	21523	156	55	A	MNG	TT	130	139	91	105	11	136	90	105	105	133	84	86	112	140	81	96	112	149	87	108	104
20	Latha	43	F	31618	150	51	A	MNG	TT	120	140	86	108	84	112	78	88	98	109	74	86	92	138	89	105	98	163	93	116	110
21	Kamatchi	24	F	32621	152	51	B	MNG	TT	120	134	88	103	105	128	79	95	100	105	79	88	90	104	76	85	74	135	93	107	105
22	Rahima bee	48	F	11799	158	52	B	MNG	TT	155	156	92	113	110	144	90	108	106	123	77	92	88	128	70	89	102	136	88	104	94
23	Sasikala	42	F	10450	152	50	B	CG	TT	105	103	85	98	103	120	70	80	93	90	68	74	70	120	72	80	80	120	72	80	83
24	Sumathi	30	F	87410	153	51	B	MNG	TT	135	104	78	87	68	104	78	87	68	104	80	88	61	122	88	99	68	127	90	102	86
25	Gunavathy	45	F	68153	152	51	B	MNG	TT	130	160	90	113	115	128	85	99	98	112	86	94	87	128	90	98	76	130	93	105	88
26	Cholaiammal	45	F	68150	154	51	B	MNG	TT	155	160	94	116	115	136	85	102	92	116	82	93	83	120	75	90	81	128	80	96	89
27	Vijayalakshmi	38	F	33654	152	51	B	MNG	TT	120	145	88	107	105	132	80	97	83	115	69	84	78	118	75	89	72	132	72	92	85
28	Valliammal	55	F	25106	153	50	B	MNG	TT	135	148	96	113	98	128	92	104	87	108	73	85	76	115	75	88	72	130	82	98	88
29	Srinivasan	45	F	37179	152	51	B	MNG	TT	140	153	89	110	108	132	80	97	95	121	82	95	85	118	85	96	72	138	98	111	85
30	Kavitha	18	F	14021	150	45	B	MNG	TT	135	125	65	85	108	105	65	78	95	101	63	76	83	105	65	78	84	128	75	93	92

S.No	Name	Age	sex	I.P.no	Ht	Wt	Group	Diagnosis	Name of surgery	Duration of surgery	Haemodynamics-Intraoperative																	
											Baseline				Induction				Incision				Endof the procedure				Extubation			
											SBP	DBP	MAP	HR	SBP	DBP	MAP	HR	SBP	DBP	MAP	HR	SBP	DBP	MAP	HR	SBP	DBP	MAP	HR
31	Shankari	39	F	16689	148	50	B	MNG	TT	120	150	98	115	115	138	90	106	97	125	92	103	90	123	85	98	78	133	80	98	88
32	Varadhan	56	M	60968	158	58	B	MNG	TT	120	160	91	114	118	141	85	104	100	129	81	97	88	130	87	101	92	140	92	108	105
33	Vasanthi	40	F	17806	151	52	B	MNG	TT	130	113	67	82	74	105	63	77	61	109	66	80	63	103	69	80	59	113	68	83	88
34	Solai	42	F	24553	152	50	B	MNG	TT	125	136	92	107	103	124	85	98	96	92	69	97	79	110	80	90	69	108	86	93	74
35	Prema	32	F	33633	150	49	B	MNG	TT	110	124	84	96	86	100	73	82	88	110	81	91	80	122	87	99	62	117	80	92	90
36	Jebashanthy	40	F	26671	152	50	B	MNG	TT	120	135	98	109	108	128	83	98	88	116	82	91	72	126	88	101	76	134	82	92	84
37	Dhanammal	48	F	7712	149	52	B	MNG	TT	170	164	90	115	113	130	88	102	98	124	80	95	88	116	88	97	78	124	84	97	72
38	Chellammal	55	F	30433	152	51	B	MNG	TT	120	139	95	110	85	110	79	84	78	118	78	105	75	136	95	109	64	138	92	107	81
39	Kavitha	24	F	21738	148	50	B	MNG	TT	130	135	80	98	103	126	77	93	88	125	76	92	86	119	75	90	80	132	82	99	90
40	Thirumalaikumari	25	F	12439	152	51	B	MNG	TT	130	145	72	96	118	128	76	93	110	104	68	77	95	106	65	82	78	117	64	78	88
41	Nathiya	22	F	7241	146	47	C	MNG	TT	65	133	88	103	98	122	82	95	85	105	76	86	68	107	71	83	60	127	75	92	82
42	Francis	30	M	7430	155	54	C	MNG	TT	95	133	96	108	88	114	81	92	89	121	88	99	80	109	84	92	88	118	80	93	98
43	Rajammal	51	F	70561	150	52	C	MNG	TT	120	148	92	111	110	128	87	101	92	117	80	92	87	110	76	87	85	126	86	99	95
44	Lakshmi	45	F	11682	153	55	C	MNG	TT	135	149	92	111	93	133	85	101	82	122	83	96	76	119	80	93	72	128	88	101	85
45	Shahayam	44	F	86175	148	52	C	MNG	TT	120	147	96	113	92	117	86	96	88	123	87	99	70	134	91	105	65	138	95	109	83
46	Shabiya	23	F	18926	142	45	C	MNG	TT	150	150	95	113	100	136	92	107	92	113	75	88	85	122	89	100	74	136	93	107	100
47	Govindammal	52	F	15405	153	51	C	MNG	TT	120	153	96	119	95	124	88	100	85	114	85	75	78	130	92	105	68	135	93	107	75
48	Sragunam	34	F	17251	155	52	C	MNG	TT	145	132	92	105	115	107	84	92	95	108	84	92	86	109	80	90	78	125	87	100	90
49	Amsa	56	F	18076	153	50	C	MNG	TT	135	150	93	112	82	124	87	99	70	111	77	88	58	134	88	103	52	133	89	104	72
50	Venkataesan	38	M	23944	152	51	C	MNG	TT	160	146	89	108	90	128	84	99	78	120	83	95	68	118	79	92	82	139	92	108	87
51	Ramadoss	57	M	25828	158	55	C	MNG	TT	75	152	97	115	90	131	92	105	88	121	88	99	80	104	79	87	70	130	93	105	83
52	Bindu	38	F	22465	152	51	C	MNG	TT	180	150	95	113	90	131	81	98	80	114	89	97	70	128	85	99	65	132	83	99	83
53	Kalaiselvi	37	F	26291	154	54	C	MNG	TT	80	138	90	106	108	124	77	93	98	101	72	82	85	102	68	79	76	125	85	98	92
54	Kannikumari	23	F	24494	152	51	C	MNG	TT	150	134	84	93	108	128	82	97	95	118	63	76	78	110	66	77	80	129	66	78	93
55	Kalaimani	55	F	20047	155	54	C	MNG	TT	165	155	90	112	90	128	82	96	80	124	84	93	65	120	85	97	72	134	88	100	78
56	Rani	32	F	26364	150	51	C	MNG	TT	150	155	92	113	106	125	88	100	92	118	82	94	74	107	75	86	66	124	86	99	79
57	Mehr banu	35	F	32331	155	53	C	MNG	TT	115	132	98	109	108	119	88	98	92	110	72	85	75	105	82	90	68	132	80	97	82
58	Angalakshmi	36	F	26345	149	55	C	MNG	TT	125	131	77	95	113	118	75	89	95	106	72	83	80	113	81	92	72	118	85	96	83
59	Latha	24	F	31234	155	51	C	MNG	TT	130	139	77	98	95	115	74	88	86	101	75	84	81	107	80	89	69	115	84	94	83
60	Kamatchiammal	42	F	31294	152	52	C	MNG	TT	150	143	95	111	108	119	83	95	89	110	78	88	74	115	82	93	69	128	85	99	78

Heart rate																	Systolic blood pressure																
time/min0	5	10	15	20	25	30	45	60	75	90	105	120	135	150	165	180	0	5	10	15	20	25	30	45	60	75	90	105	120	135	150	165	180
96	98	93	90	88	89	93	95	98	100	105	96	100	103	102	98	95	143	148	145	142	138	143	146	130	143	146	136	138	143	137	139	145	150
92	94	93	90	88	87	85	90	92	93	91	89	93	100	115			152	150	149	148	143	142	140	145	140	141	134	137	131	138	163		
115	104	101	108	101	93	88	84	79	82	81	79	83	122	125			137	141	141	147	143	136	134	134	125	120	124	144	146	148	153		
74	72	77	66	62	95	87	78	77	74	70	71	69	82	108			102	101	104	105	105	128	108	110	107	104	105	106	107	138	153		
88	79	70	64	71	67	66	62	62	63	61	71	67	63	68	59	62	107	109	124	122	122	123	130	125	127	123	123	125	127	122	133	136	131
93	105	101	100	92	93	90	85	88	57	65	60	93					121	116	115	114	112	139	128	108	120	136	133	115	147				
108	106	95	87	99	70	71	88	94	101								108	108	112	90	91	97	126	125	123	125							
100	121	100	115	118	121	141	139	132	122	104	102	105					121	133	135	142	151	150	139	139	121	117	122	141	136				
97	96	98	94	98	95	94	95	82	99	90	111						132	134	132	137	136	139	136	135	128	143	131	144					
92	90	97	95	100	93	94	90	103	104	88	92	90					100	101	101	101	100	102	97	96	124	114	1109	117	131				
90	92	85	88	90	86	82	64	70	83								136	138	145	148	135	136	136	119	130	143							
88	78	70	73	71	60	59	56	52	49	50	54	56	57	56	98		148	109	111	118	120	131	123	133	107	143	150	160	154	152	153	163	
68	74	71	70	73	71	70	69	64	65	76	83	92	105				109	135	110	117	120	121	121	123	123	139	127	129	133	131			
141	129	122	114	107	93	91	79	82	88								100	90	100	104	100	105	110	120	116	123							
88	78	67	75	70	81	72	96	72	75	95							150	152	128	134	121	124	120	126	120	119	142						
103	98	92	81	78	76	73	75	74	77	80	102	105	118				136	151	142	143	133	120	147	130	130	140	148	149	148	153			
88	91	88	90	72	90	84	92	73	74	86	84						111	117	110	118	108	110	108	121	109	112	115	136					
106	105	95	93	100	100	93	98	95	93	105	110	100	110	121			138	132	121	121	123	120	120	123	141	128	108	110	105	119	148		
101	102	103	106	104	108	105	110	111	112	110	108	14-Apr	107				133	134	133	139	139	141	143	133	137	140	143	145	140	149			
95	98	85	84	82	83	87	88	90	92	91	89	93	96	99	97	110	130	142	143	141	137	122	111	113	115	128	132	133	143	145	143	144	160
98	89	93	90	80	99	93	82	89	97	90	82	75					105	102	101	99	101	109	101	112	111	122	122	109	104				
88	90	90	78	87	82	77	73	75	78	74	77	78	76	75	86	106	123	118	117	119	117	120	131	134	133	127	125	122	118	130	125	133	140
103	93	70	67	70	73	72	74	70	63	70	80						130	120	88	88	88	87	88	90	99	98	99	100					
61	64	68	63	57	57	61	82	70	63	62	67	68	74	76	87	86	104	104	106	105	106	108	108	128	126	121	126	117	125	124	124	130	127
87	85	83	81	78	77	83	84	85	89	87	83	84	85	88			118	120	121	122	121	122	121	121	121	118	119	118	119	128	130		
84	82	80	81	82	80	82	80	82	80	78	78	76	75	81	85	89	118	116	116	118	119	120	124	119	108	104	110	112	115	118	121	119	129
78	82	83	80	79	78	77	75	73	72	71	75	72	83	92			115	110	112	118	123	122	121	122	125	118	119	119	118	123	132		
76	75	72	73	74	76	78	81	82	78	75	72	73	72	88			108	104	103	110	114	114	118	118	122	121	122	119	118	115	130		
85	81	78	76	75	72	73	70	71	76	77	78	80	81	85			121	119	118	116	115	120	121	123	122	125	118	119	122	120	132		
83	90	92	85	83	80	84	87	85	89	85	84	92					101	97	101	101	100	103	107	104	102	111	112	105	128				

Heart rate																	Systolic blood pressure																
time/min0	5	10	15	20	25	30	45	60	75	90	105	120	135	150	165	180	0	5	10	15	20	25	30	45	60	75	90	105	120	135	150	165	180
90	91	88	82	76	80	82	75	68	64	69	78	88					125	128	125	121	119	127	126	125	126	128	122	123	133				
88	85	83	84	78	76	75	77	73	74	78	85	90	87	92			129	123	121	128	126	123	128	129	123	122	125	130	133	131	131		
63	58	50	60	58	53	58	58	56	61	66	63	59	56	58	62		109	108	110	100	108	99	101	99	99	110	107	111	103	106	112	113	
103	96	79	77	79	78	83	78	86	65	68	76	78	80				136	124	92	92	93	94	117	116	110	106	107	108	110	112			
80	82	80	81	80	74	74	66	71	68	64	75	88					110	114	114	113	114	115	112	115	114	118	121	125	117				
72	70	68	62	75	73	78	74	72	73	76	74	76	76	80			116	118	116	118	113	126	126	132	134	132	134	126	134	126	134		
88	85	81	80	78	79	85	89	92	85	78	72	75	81	83	88		124	121	119	118	116	119	121	123	128	123	116	123	122	126	128	130	
75	76	78	77	75	76	75	75	74	67	64	58	64	81				118	117	125	123	104	104	120	115	108	113	121	137	136	138			
86	83	85	86	87	88	90	86	93	87	85	82	83	80	90			125	118	115	112	115	113	116	117	128	122	121	120	116	119	132		
95	90	80	76	85	84	83	82	88	82	86	88	86	83	82			115	104	107	104	104	108	104	108	110	108	110	103	106	111	117		
68	67	70	71	72	69	68	65	68	63	64	62	60	84				105	108	110	112	113	109	108	106	108	110	112	113	107	127			
80	78	75	77	79	73	71	72	75	76	80	81	82	85	88	98		121	123	124	118	109	106	107	109	105	116	109	100	102	105	109	118	
87	89	85	88	82	83	88	92	87	83	82	83	78	76	74	72	78	117	124	114	123	118	112	114	112	104	106	114	112	106	102	110	112	115
76	75	78	79	80	81	82	84	78	75	76	73	71	72	85			122	123	124	125	131	130	128	121	118	121	122	128	123	119	128		
70	67	68	64	66	64	64	63	64	63	60	61	60	69	83			123	123	132	130	131	131	133	133	129	127	128	127	134	133	138		
85	83	76	72	66	72	78	80	84	78	72	71	80	72	74	100		113	115	96	98	98	102	112	124	121	112	112	121	119	123	122	136	
78	78	76	70	67	63	63	66	59	61	64	64	68	78				114	120	97	119	108	108	104	118	124	125	128	129	130	135			
86	88	87	85	81	86	83	81	83	85	85	83	82	75	78	90		108	108	105	104	103	102	102	99	99	101	104	105	107	108	109	125	
58	60	64	62	58	64	66	62	69	65	63	64	58	54	62	72		111	112	108	102	106	108	118	123	124	134	134	138	136	134	136	133	
68	65	62	62	65	66	63	62	64	63	65	72	75	78	82	87		120	117	117	116	114	128	127	128	126	121	124	122	119	119	135	139	
80	80	80	75	73	75	72	71	73	70	83							121	119	119	119	125	128	128	126	115	104	130						
70	62	62	61	62	65	63	69	70	66	60	63	64	61	61	68	65	114	112	111	108	106	113	111	121	117	115	119	118	121	122	127	134	128
85	88	85	83	78	74	76	78	73	76	82	92						101	109	118	107	107	107	110	103	111	113	104	125					
78	76	74	81	73	68	70	67	73	76	72	78	80	78	80	93		118	116	116	107	114	120	112	113	114	110	105	117	110	117	110	129	
65	64	73	69	69	61	59	57	53	55	54	63	56	53	60	72	75	124	102	106	101	125	117	112	121	117	120	122	126	122	128	117	120	134
74	71	68	69	66	64	65	71	73	74	75	76	70	69	72	75	79	118	115	112	120	122	123	121	123	120	123	128	130	124	125	120	123	124
75	70	73	72	75	76	77	75	73	74	75	73	72	85				110	113	115	117	115	116	115	114	115	119	112	110	108	132			
80	78	75	72	70	71	73	75	72	77	76	79	72	80	84			106	108	110	112	109	111	112	116	113	110	114	108	113	119	124		
81	79	75	77	75	73	72	79	83	78	78	71	69	72	86			101	97	96	102	108	112	121	121	121	116	105	106	108	109	115		
74	72	73	75	68	69	71	70	68	66	72	73	74	75	69	78		110	112	111	113	117	115	118	119	122	121	123	122	124	118	115	129	

Diastolic Blood pressure																
0	5	10	15	20	25	30	45	60	75	90	105	120	135	150	165	180
82	85	86	84	80	82	86	79	83	85	83	84	91	85	90	92	78
96	93	88	95	94	93	96	92	93	96	94	95	90	92	95		
98	102	102	102	103	97	96	95	93	90	95	96	95	98	96		
70	71	76	72	75	74	75	76	75	75	73	75	77	82	98		
77	76	94	88	88	87	90	88	92	89	93	93	92	93	88	88	99
82	70	69	69	72	83	81	75	80	69	68	74	92				
67	68	74	65	67	67	85	84	79	92							
82	100	99	103	98	96	75	78	78	78	81	89	85				
98	98	97	97	98	95	89	90	88	97	94	97					
70	70	73	73	72	75	65	75	85	77	80	67	80				
106	110	115	118	97	98	98	77	91	99							
93	83	81	85	85	88	83	85	74	93	97	95	95	96	98	95	
78	104	75	83	84	83	89	86	83	85	87	88	92	91			
66	60	60	62	60	70	74	80	78	82							
99	95	92	93	83	89	84	82	85	79	97						
112	111	107	112	110	98	115	102	100	103	104	103	100	106			
78	89	76	87	70	75	79	90	80	80	81	91					
91	91	85	85	83	81	81	84	88	85	90	92	73	75	90		
84	90	91	91	90	91	89	78	76	75	78	88	81	87			
97	99	97	98	92	69	77	78	79	79	78	79	79	83	82	82	92
														83		
79	73	71	72	71	90	71	72	72	84	82	76	76				
77	74	75	77	77	79	81	87	88	84	83	88	78	82	81	88	89
98	70	64	63	60	64	68	60	72	72	80	70					
80	81	79	79	79	82	82	82	78	74	78	85	83	79	88	92	90
85	83	82	83	83	82	83	82	80	78	76	75	72	83	92		
81	80	79	80	81	80	82	78	75	72	75	78	79	78	76	78	83
69	72	74	75	72	74	75	73	75	78	75	72	75	76	72		
73	70	72	72	73	80	78	72	75	73	72	70	73	75	82		
82	81	78	77	75	78	76	77	71	72	78	75	81	85	92		
63	58	63	67	63	60	67	65	62	66	65	65	75				

Mean Arterial pressure																
0	5	10	15	20	25	30	45	60	75	90	105	120	135	150	165	180
102	106	106	103	99	102	106	96	103	105	101	102	108	102	106	110	102
96	112	108	113	110	109	111	110	109	111	107	109	104	107	118		
111	115	115	116	116	110	109	108	104	100	105	112	112	115	115		
80	80	85	82	86	96	86	83	81	80	84	85	87	100	116		
87	88	104	99	99	99	103	100	105	102	103	104	104	103	103	104	110
95	85	84	84	85	102	97	86	93	91	90	88	110				
81	81	87	73	75	75	77	99	98	94	103						
95	111	111	116	116	114	96	98	92	91	95	106	102				
109	110	109	110	111	110	105	105	101	112	109	113					
80	81	82	82	81	84	76	82	98	89	92	84	97				
116	119	125	131	110	110	110	87	104	113							
111	92	91	96	97	102	96	101	85	110	114	117	115	115	116	117	
88	114	87	94	96	96	100	98	96	103	100	102	106	108			
77	70	73	76	73	82	86	93	91	96							
116	114	105	107	92	98	94	106	100	95	111						
120	127	121	123	120	110	129	114	106	117	117	118	116	122			
89	98	87	97	83	87	89	100	90	91	92	106					
107	105	97	97	96	94	94	97	106	99	96	98	84	90	109		
100	105	105	105	104	102	103	92	90	97	100	107	101	108			
108	113	112	110	107	87	88	90	91	95	96	97	100	104	102	103	115
88	83	81	81	81	96	81	85	85	97	95	86	85				
92	89	89	91	90	93	98	103	103	98	97	99	91	98	96	103	106
90	80	70	70	69	71	73	74	81	80	85	80					
88	88	88	88	88	91	91	97	94	90	94	96	97	94	100	105	102
96	95	95	96	96	95	96	95	94	91	90	89	88	98	105		
94	92	91	93	94	93	96	92	86	83	87	89	91	91	91	92	98
84	85	87	89	89	90	90	89	92	91	90	88	89	92	92		
85	81	82	85	87	91	91	87	92	89	89	86	88	88	98		
95	94	91	90	88	92	91	92	88	90	91	90	95	97	105		
76	71	72	75	73	71	76	73	72	77	81	74	93				

Diastolic Blood pressure																	
0	5	10	15	20	25	30	45	60	75	90	105	120	135	150	165	180	
92	96	90	85	83	85	78	81	89	91	87	85	80					
81	78	75	74	71	72	71	70	72	74	78	79	81	83	78			
66	66	68	64	66	65	72	71	70	76	73	71	69	67	69	69		
92	85	69	76	70	71	83	82	80	77	76	86	85	83				
81	84	86	86	86	86	85	86	86	87	87	83	80					
82	78	84	78	81	88	88	94	82	94	82	88	82	88	82			
80	83	84	82	85	88	85	84	89	85	88	85	84	81	84	82		
98	94	94	91	85	85	94	82	88	88	88	98	95	92				
76	72	70	68	73	72	75	72	78	72	73	72	70	75	82			
72	73	71	70	66	65	71	60	75	64	67	69	68	73	64			
76	75	72	74	71	72	68	65	66	69	70	71	71	75				
88	82	81	81	80	78	80	78	74	81	75	75	72	78	84	80		
80	83	80	78	80	75	68	68	72	68	72	74	70	69	75	78	79	
83	82	84	88	92	88	86	80	79	78	75	70	75	80	88			
87	88	95	95	95	94	94	93	93	93	92	90	91	90	95			
75	74	66	67	67	72	74	86	75	74	79	91	85	89	89	93		
85	87	77	92	82	80	78	82	85	83	80	85	92	93				
84	83	80	79	78	78	78	72	75	75	78	78	78	79	80	87		
77	76	74	76	78	74	75	78	74	80	86	80	86	88	86	89		
83	82	83	81	81	90	88	88	83	93	89	83	81	80	87	92		
88	87	88	85	83	94	91	90	82	79	93							
89	84	82	81	79	75	75	82	83	81	82	83	83	87	89	84	85	
72	78	82	74	75	75	74	73	75	75	71	85						
63	68	68	63	74	65	64	59	70	58	57	62	66	60	66	66		
84	65	66	66	81	67	54	76	75	68	59	76	71	65	63	85	88	
82	80	82	78	75	70	72	74	70	72	74	73	72	75	73	78	86	
72	88	82	82	85	83	82	84	83	81	83	80	83	80				
72	70	71	73	75	76	78	79	75	72	70	80	81	82	89			
75	72	71	74	75	76	78	85	89	85	80	79	80	78	89			
78	84	82	75	83	81	82	82	87	82	86	83	86	83	82	84		

Mean Arterial pressure																	
0	5	10	15	20	25	30	45	60	75	90	105	120	135	150	165	180	
103	107	101	97	95	99	94	96	101	103	99	98	98					
97	93	90	92	89	89	90	90	89	90	94	96	98	99	96			
80	80	82	76	80	76	82	80	80	87	84	84	80	80	83	83		
107	98	77	77	78	79	94	93	90	87	86	93	93	93				
91	94	95	95	95	96	94	96	95	97	98	97	92					
91	87	92	87	90	101	101	105	92	105	92	101	92	101	92			
95	96	96	94	95	98	97	97	102	98	97	98	97	96	99	98		
105	101	104	102	91	91	102	93	95	98	101	112	109	107				
92	87	85	83	87	86	89	87	95	89	89	88	85	90	99			
82	81	80	78	72	76	80	74	83	76	81	77	76	82	78			
86	86	85	87	85	84	81	79	80	83	84	85	83	92				
99	96	95	93	90	87	89	88	84	93	86	83	82	87	92	93		
92	97	91	93	93	87	83	83	83	81	86	87	82	80	87	89	91	
96	96	97	100	105	102	100	94	92	92	91	89	91	93	101			
99	100	107	107	107	106	107	106	105	104	104	102	105	104	109			
88	88	76	77	77	82	87	99	90	87	90	101	96	100	100	101		
75	108	80	105	89	88	85	94	101	97	96	100	105	107				
92	91	88	87	86	86	86	81	82	84	87	87	88	89	90	100		
88	84	82	80	84	85	89	93	91	104	103	104	103	103	103	104		
95	94	94	93	92	103	101	101	97	102	101	96	94	93	103	108		
99	99	98	96	97	105	103	102	93	87	105							
97	94	92	90	88	88	87	95	94	92	94	95	96	99	102	101	99	
82	88	94	85	86	86	86	84	87	88	82	98						
76	79	79	81	87	77	75	68	77	74	74	86	77	70	77	78		
93	76	73	74	89	60	62	94	86	86	94	86	82	90	78	97	100	
94	92	92	92	91	88	88	90	87	89	92	92	89	92	89	93	99	
85	96	93	94	95	94	93	94	94	94	93	90	91	97				
83	83	84	86	86	88	89	91	88	85	85	89	92	94	100			
84	80	79	83	86	88	92	97	100	95	88	88	89	88	98			
88	94	92	88	94	92	94	95	99	95	98	96	99	95	93	99		

	VAS																			Heart rate																	
Total Fentanyl in mcg	0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6	10	14	18	22	24	Duration of analgesia(mts)	0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6	10	14	18	22	24
160	6	2	2	2	2	2	2	3	3	3	3	3	3	5	2	2	3	3	30	95	96	103	90	92	94	98	103	112	113	110	108	106	111	120	100	98	102
140	6	1	1	1	1	2	2	2	2	3	3	3	3	4	5	2	2	2	30	100	102	98	95	93	92	88	85	89	90	92	91	93	92	90	89	94	95
120	8	2	2	2	2	2	2	2	3	3	3	3	4	5	2	3	3	3	30	115	110	108	105	102	96	97	98	96	95	95	92	94	92	92	92	94	92
140	7	1	1	2	2	2	3	3	3	3	3	3	3	4	5	3	3	3	30	95	92	89	90	88	87	85	89	90	92	93	95	92	98	100	105	88	92
140	8	1	2	2	2	2	2	3	3	3	3	3	4	5	3	3	3	3	30	83	88	90	91	87	89	85	86	90	92	95	98	96	89	90	105	106	108
140	6	1	1	2	2	2	2	2	3	3	3	3	4	5	2	2	3	3	30	93	85	82	80	83	84	81	81	81	85	85	84	85	86	90	89	82	85
120	7	1	1	1	1	1	2	2	2	2	2	2	2	4	5	2	2	3	30	103	101	99	105	102	98	96	95	94	93	94	96	93	92	90	93	94	92
100	8	2	2	2	2	2	2	3	3	3	3	3	4	4	5	2	2	3	30	106	102	98	96	95	94	93	92	95	92	90	96	105	106	110	92	88	90
120	7	1	1	1	1	2	2	2	2	2	2	2	4	5	2	3	3	3	30	110	102	100	98	97	96	95	92	93	94	92	95	98	108	82	95	92	93
140	7	1	1	1	2	2	2	2	2	2	3	3	4	5	2	3	3	3	30	95	98	102	96	92	89	88	92	94	95	92	93	95	107	95	96	97	98
140	3	3	3	4	5	2	2	3	3	3	3	3	3	4	5	2	2	3	120	110	92	94	92	93	92	90	92	90	93	94	95	96	105	89	90	92	93
140	3	3	4	4	5	2	2	3	3	3	3	4	4	4	5	2	2	3	120	85	75	78	80	85	88	89	87	88	89	84	85	86	94	88	85	86	85
140	3	3	3	3	3	3	5	3	3	3	3	4	4	4	4	5	3	3	180	105	95	88	87	85	88	89	83	78	81	85	83	82	95	90	92	89	89
120	3	3	3	3	3	4	5	4	4	4	4	4	4	4	5	3	3	3	180	95	88	90	95	96	98	92	90	89	88	85	86	89	103	108	92	93	90
120	3	3	3	3	4	4	5	3	4	4	4	4	4	4	4	5	3	3	180	98	85	88	82	86	89	90	92	89	87	86	92	95	102	93	90	88	85
140	6	3	3	3	3	3	3	3	3	4	4	4	4	5	2	3	3	3	30	106	95	92	88	87	85	86	85	86	82	86	87	92	95	87	85	86	82
120	7	3	3	3	3	3	3	3	3	4	4	4	4	4	5	2	3	3	30	95	88	87	85	83	82	80	81	86	87	88	83	84	89	94	85	81	87
140	8	3	3	3	3	3	3	3	3	3	4	4	4	4	5	2	3	3	30	128	116	108	103	98	96	95	93	92	90	92	93	94	95	109	99	92	90
140	8	3	3	3	3	3	3	3	3	3	4	4	4	5	2	3	3	3	30	106	98	95	93	92	90	89	91	92	90	93	103	103	110	91	94	90	87
140	3	3	3	4	5	4	4	4	4	4	4	4	4	5	2	3	3	3	120	115	96	92	93	95	91	90	89	87	85	86	92	95	106	92	90	93	92
100																																					
100	2	2	2	2	2	2	2	3	3	3	3	4	5	3	3	4	4	4	600	92	88	82	80	81	78	80	82	85	82	85	88	95	83	78	76	70	72
100	2	2	2	2	3	3	3	3	3	3	4	4	4	5	3	3	3	4	840	88	85	81	82	81	86	83	81	89	90	85	83	84	84	89	84	83	84
100	2	2	2	2	2	2	2	2	2	2	3	3	4	5	3	3	4	4	840	72	70	67	71	72	73	70	73	73	69	68	75	78	89	82	80	81	83
100	2	2	2	2	2	2	3	3	3	3	3	3	4	5	3	4	4	4	840	83	80	78	76	75	72	70	69	67	70	71	72	78	88	85	84	88	87
100	2	2	2	2	3	3	3	3	3	3	3	5	3	3	3	4	4	4	480	83	82	81	76	75	76	73	74	79	80	82	98	89	87	85	88	87	86
100	2	2	2	2	2	2	3	3	3	3	4	5	3	3	3	4	4	4	480	85	82	80	79	76	77	76	75	72	73	74	85	80	78	79	77	75	78
100	2	2	2	2	2	2	2	3	3	3	3	4	5	3	3	3	4	4	600	85	80	78	75	76	73	71	72	74	72	74	75	89	80	79	78	80	81
100	1	1	2	2	2	2	2	2	3	3	3	3	5	3	3	4	4	4	600	72	75	78	81	82	80	77	75	72	73	70	72	85	75	73	70	71	71
100	1	1	1	1	2	2	2	3	3	3	3	3	5	3	3	4	4	4	600	80	81	78	77	75	74	75	76	78	77	73	71	92	85	80	81	80	79
100	1	2	2	3	3	3	3	3	3	3	4	4	5	3	3	4	4	4	600	87	83	78	75	72	70	73	75	74	72	70	74	88	75	82	79	81	83

	VAS																			Heart rate																			
Total Fentanyl in mcg	0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6	10	14	18	22	24	Duration of analgesia(mts)	0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6	10	14	18	22	24
100	1	1	2	2	2	2	2	2	2	2	2	3	5	4	4	4	4	4	600	81	78	75	76	76	78	73	75	71	70	78	88	95	92	89	87	85	82
100	3	3	3	3	3	3	3	4	4	4	4	4	5	3	3	4	4	4	600	87	85	83	80	81	82	79	78	80	84	83	81	95	80	77	79	75	76
100	2	2	2	2	2	2	2	2	2	2	2	3	4	5	2	2	2	2	840	60	62	58	63	62	60	65	53	59	57	59	63	60	66	68	84	83	84
100	2	2	2	2	2	2	2	2	2	2	3	3	5	2	3	3	4	4	600	67	71	70	73	69	67	68	70	71	70	73	69	70	66	75	78	92	85
100	1	1	2	2	2	2	2	2	3	3	3	3	3	5	3	3	4	4	840	77	75	72	70	68	69	71	73	70	73	75	78	85	90	82	78	75	71
100	2	2	2	2	2	3	3	3	3	3	3	4	4	5	3	3	4	4	840	82	82	84	80	86	84	80	86	84	88	82	80	78	88	77	78	85	83
100	3	3	3	3	3	3	3	4	4	4	5	3	3	3	4	4	4	4	330	73	72	70	69	68	72	73	75	77	76	88	80	78	75	76	77	75	71
100	2	2	2	2	2	2	2	2	3	3	3	4	4	5	3	3	4	4	600	75	70	71	68	63	65	68	70	71	72	73	76	78	89	74	76	75	78
100	3	3	3	3	3	3	3	4	4	4	4	4	5	2	3	3	3	4	480	86	88	85	82	81	83	87	85	82	83	85	88	95	79	80	82	83	84
100	1	1	2	2	2	2	2	3	3	3	3	3	3	5	3	3	3	4	600	78	75	72	73	68	69	71	70	72	73	76	78	80	90	82	85	82	80
100																																								
100	1	1	1	1	1	1	1	1	1	1	1	1	1	2	3	5	2	2	1080	?																			
100	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	5	2	2	1080	85	81	82	83	78	79	78	80	81	82	83	80	78	83	85	97	82	83
100	1	1	1	1	1	1	1	1	2	2	2	2	3	4	5	2	2	2	840	85	87	85	82	80	78	79	77	75	78	79	80	82	85	92	82	88	82
100	1	1	1	1	1	1	1	1	1	1	2	2	3	4	5	1	2	2	840	78	76	73	72	70	68	69	66	65	72	74	73	78	82	89	78	77	75
100	1	1	1	1	1	1	1	1	1	1	2	2	2	2	4	5	2	2	1080	78	75	72	68	65	63	62	60	63	62	64	65	63	64	72	88	73	70
100	1	1	1	1	1	1	1	1	1	1	2	2	2	4	5	1	2	2	840	95	88	85	82	78	75	74	70	72	72	73	70	71	73	92	70	72	74
100	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	5	2	2	1080	72	75	72	68	67	66	65	63	67	59	61	63	64	65	72	85	72	78
100	1	1	1	1	1	1	1	1	1	1	2	2	2	2	4	5	2	2	1080	88	85	78	75	71	70	69	74	74	72	71	70	70	72	75	90	75	76
100	1	1	1	1	1	1	1	1	1	1	2	2	2	2	3	5	2	2	1080	68	69	62	64	66	62	64	66	63	65	62	60	61	63	68	82	75	72
100	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4	5	2	2	1080	85	74	76	67	68	70	71	72	70	68	67	69	65	66	68	80	75	74
100	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	5	2	2	1080	83	84	82	81	83	79	78	77	79	78	77	80	79	84	82	92	82	80
100	1	1	1	1	1	1	1	1	1	1	1	1	1	3	5	2	2	2	840	85	82	80	82	81	79	76	82	85	84	80	82	79	78	88	76	80	78
100	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	5	2	2	1080	88	87	85	89	88	86	82	80	81	83	84	81	80	83	85	92	80	78
100	1	1	1	1	2	2	2	2	2	2	2	2	3	4	5	1	2	2	840	88	80	83	84	82	84	83	87	86	89	81	78	76	72	93	77	74	76
100	1	1	1	1	1	1	2	2	2	2	2	2	2	3	5	1	1	2	840	86	84	79	78	76	74	75	74	79	82	84	80	82	88	96	82	80	80
100	1	1	1	1	1	1	1	1	1	1	2	2	3	4	5	1	2	2	840	70	68	66	65	61	60	63	65	69	71	72	74	73	72	82	80	81	76
100	1	1	1	1	1	1	1	1	1	2	2	2	4	5	1	2	2	3	840	80	78	75	70	68	69	70	72	70	71	72	74	78	79	71	72	76	72
100	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	5	1	1	1080	70	73	72	68	67	70	71	72	73	71	72	69	66	75	76	89	70	69
100	1	1	1	1	1	1	1	1	1	2	2	2	2	2	3	5	1	2	1080	78	75	71	68	69	65	66	70	71	72	73	74	71	72	75	83	70	69
100	1	1	1	1	1	1	1	1	1	1	2	3	3	3	4	5	1	2	1080	82	78	76	75	71	72	76	78	72	69	67	71	73	72	96	66	70	73

Postoperative																																										
Systolic blood pressure																			Diastolic blood pressure																								
0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6	10	14	18	22	24	0	0.5	1	1.5	2	25	3	3.5	4	4.5	5	5.5	6	10	14	18	22	24							
137	145	153	138	140	139	145	152	158	155	155	152	153	148	158	138	145	150	85	86	90	88	86	88	92	96	98	95	90	93	96	98	95	90	92	98							
150	148	145	143	142	139	140	142	143	145	143	142	150	153	152	153	152	145	88	90	92	95	90	88	89	88	82	85	88	89	88	89	90	90	92	90							
150	148	145	143	145	146	145	148	139	138	140	142	143	143	152	155	152	153	90	92	90	92	98	95	92	92	90	88	90	92	94	92	94	96	98	94							
145	142	138	130	128	123	124	122	124	133	134	138	142	138	140	143	144	140	92	90	85	80	82	82	83	82	82	88	85	92	95	92	90	92	95	90							
142	138	124	125	123	122	120	121	122	124	125	133	130	132	138	150	131	128	90	88	83	82	84	86	83	82	83	82	86	92	93	92	88	92	90	85							
149	135	133	130	128	126	123	122	125	123	122	132	133	145	128	129	123	125	91	85	82	82	85	86	82	84	85	82	83	85	86	92	92	88	85	82							
128	125	126	128	125	126	125	126	118	116	118	125	126	125	126	125	122	123	100	98	102	101	100	102	103	102	100	105	102	96	98	97	107	105	98	96							
142	142	135	142	150	150	145	143	142	143	138	140	141	142	143	144	145	143	90	95	100	103	98	92	90	92	90	92	91	92	95	96	98	96	98	99							
143	142	138	136	133	135	133	132	143	144	145	143	144	153	148	145	143	148	95	96	92	93	92	91	92	94	98	96	95	97	95	100	98	96	95	92							
138	136	133	128	135	136	135	133	135	133	132	132	133	140	142	145	142	145	89	90	92	88	90	94	92	94	92	93	95	96	97	96	95	92	93	94							
148	138	139	142	140	141	140	142	143	140	141	142	141	142	138	136	134	135	100	98	100	99	96	95	93	92	92	90	`	91	92	98	90	90	88	85							
123	153	152	164	153	148	149	151	152	153	154	152	153	153	145	143	143	142	87	97	97	93	92	93	94	92	93	92	91	91	92	101	96	92	93	92							
131	128	129	128	125	128	132	138	139	142	142	142	143	142	140	141	142	145	91	90	90	92	93	94	92	88	85	89	87	88	85	82	83	82	83	85							
138	130	128	129	131	130	132	133	132	133	133	138	138	140	145	133	131	130	98	86	84	83	90	92	94	92	94	93	92	96	92	98	101	90	92	90							
143	128	123	124	132	133	134	131	132	133	138	130	131	145	128	125	121	130	96	85	83	84	88	86	85	86	87	85	90	89	89	93	88	84	86	88							
148	130	132	130	131	132	130	132	133	134	140	141	142	155	138	140	142	140	102	96	94	92	90	92	90	91	92	94	92	93	94	100	92	90	90	93							
143	132	133	128	127	129	128	124	125	126	124	131	133	132	141	139	132	125	96	88	84	83	84	83	82	83	84	82	83	89	85	84	90	81	82	89							
155	145	138	137	132	133	134	133	134	133	135	133	131	132	150	138	133	131	96	92	90	85	83	82	86	88	82	80	85	83	84	82	95	85	80	82							
148	145	133	125	123	123	125	126	129	135	133	132	140	148	142	133	132	131	89	83	81	82	80	78	77	78	79	80	82	83	80	98	90	90	88	87							
156	138	132	130	128	126	125	125	126	122	125	126	133	145	138	132	133	136	98	89	78	74	76	72	73	72	73	75	76	78	83	90	88	87	86	88							
123	125	128	122	123	122	125	124	123	125	122	125	123	115	112	113	110	112	88	86	85	84	85	82	86	90	93	95	92	92	92	83	72	72	70	73							
125	126	135	128	127	128	129	115	114	114	116	116	114	112	112	121	122	125	83	80	87	84	85	84	86	84	83	84	82	84	87	87	82	84	82	84							
105	110	106	108	110	112	113	116	115	110	108	117	119	128	121	120	121	123	72	75	72	73	74	70	71	74	73	75	72	75	80	85	83	80	82	85							
123	122	118	116	115	115	116	118	120	121	122	122	121	132	129	122	130	131	85	83	80	76	74	73	72	76	78	79	78	75	74	83	85	83	84	85							
123	121	122	121	122	121	120	121	118	119	121	135	128	117	115	116	118	125	89	85	82	83	84	82	81	82	80	78	79	88	83	82	85	83	82	83							
123	115	116	119	121	122	123	122	121	120	121	135	128	127	123	124	122	125	82	78	75	76	80	82	83	84	82	83	81	92	88	85	82	82	84	85							
123	118	119	115	116	118	119	116	112	110	118	123	136	121	117	115	114	121	72	73	71	72	75	70	72	73	75	73	74	75	92	82	83	81	82	82							
128	121	119	118	122	124	123	121	122	121	120	125	130	129	126	124	123	121	80	82	83	85	81	82	80	81	82	83	82	80	95	92	89	83	82	78							
125	121	122	123	119	118	117	120	122	125	122	121	143	132	128	123	122	123	78	79	81	82	79	78	77	73	75	76	78	79	89	85	82	83	81	80							
128	121	119	118	116	115	116	118	119	121	122	120	132	112	125	122	121	125	75	73	70	72	73	72	73	72	73	74	75	73	78	75	73	74	73	72							

Postoperative																																										
Systolic blood pressure																			Diastolic blood pressure																								
0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6	10	14	18	22	24	0	0.5	1	1.5	2	25	3	3.5	4	4.5	5	5.5	6	10	14	18	22	24
128	126	121	116	118	114	120	128	123	121	123	128	134	130	128	129	125	124	84	82	84	78	79	74	78	84	88	86	81	89	92	90	89	90	90	91
129	125	123	125	123	128	128	129	130	131	133	129	135	131	125	126	127	128	72	68	69	71	75	78	70	71	80	82	85	85	90	88	85	83	82	83
124	123	125	128	123	125	122	127	130	128	122	136	132	132	122	108	109	108	74	73	74	78	80	79	79	78	84	83	77	87	79	66	70	68	68	68
110	109	106	104	102	104	108	112	109	112	110	108	129	106	115	123	128	125	80	72	80	76	68	70	72	80	79	80	78	80	79	66	70	73	75	73
120	121	119	122	123	125	125	121	122	125	120	122	121	128	119	115	118	116	80	76	75	75	71	76	73	74	72	70	71	75	78	85	77	75	71	73
110	122	124	122	120	118	116	122	124	126	128	130	128	135	123	122	125	123	90	86	80	78	80	78	80	78	86	84	82	80	78	85	76	74	71	72
114	116	118	119	121	122	120	119	116	125	132	123	121	122	119	118	123	124	84	82	80	81	82	83	84	82	80	83	89	83	85	84	82	83	81	78
121	120	122	125	125	123	124	122	124	123	125	123	124	138	125	123	124	126	85	83	85	83	78	80	81	82	86	85	81	82	83	93	88	85	82	86
125	123	122	121	122	121	120	121	122	121	122	124	138	118	120	123	122	124	80	78	75	73	72	73	70	72	73	72	74	68	88	75	78	72	74	72
115	116	115	120	121	122	123	125	123	122	121	123	124	128	117	115	116	117	65	68	69	68	70	72	73	70	72	70	72	73	74	89	81	83	86	85
124	118	116	115	114	113	112	110	115	118	116	115	112	113	124	129	118	115	76	75	72	70	69	68	67	70	71	73	75	72	68	71	78	85	72	76
125	119	116	115	114	118	113	115	116	117	121	122	120	121	123	128	119	121	83	78	76	75	72	71	70	72	75	73	72	73	75	72	73	74	75	72
124	123	119	118	117	116	115	116	110	112	114	115	120	121	130	122	123	125	86	85	78	77	75	72	73	74	75	76	78	75	78	79	93	73	78	73
120	118	119	116	115	116	113	115	116	115	116	115	116	118	129	123	120	121	72	72	73	70	72	70	72	73	74	73	74	75	72	73	92	85	83	82
128	125	131	130	132	133	130	131	132	133	132	133	128	129	125	145	123	125	88	87	90	91	92	92	90	92	90	91	92	89	88	87	82	95	85	88
122	115	116	115	116	115	115	113	112	121	118	119	123	124	138	128	123	121	89	78	72	70	68	67	74	75	74	75	74	78	83	82	94	92	90	90
128	123	125	123	124	123	124	121	121	122	121	122	123	125	126	139	124	123	90	88	91	92	89	88	85	82	80	78	74	75	74	75	74	89	85	81
110	100	94	93	104	98	96	97	105	97	100	95	95	104	95	123	112	110	80	68	68	62	70	66	61	65	66	63	65	66	64	72	63	87	78	75
122	110	125	121	111	119	118	127	118	122	122	123	125	123	128	133	118	119	71	61	64	75	71	78	79	75	79	70	74	75	72	75	82	89	72	75
122	109	107	108	114	109	107	108	104	112	108	109	104	108	120	132	121	118	82	68	66	66	68	70	68	68	66	66	60	62	62	64	72	75	72	70
130	122	120	118	122	120	116	114	116	115	112	108	110	123	130	136	125	123	93	78	74	78	72	70	70	72	76	72	70	70	70	78	89	81	80	82
126	126	127	126	124	122	126	122	118	119	128	126	132	130	138	124	128	122	84	86	85	88	80	84	79	80	82	79	86	88	84	83	88	81	88	80
100	104	114	109	106	112	110	112	114	110	108	106	104	110	110	128	118	115	70	70	70	72	68	66	68	70	70	70	70	72	70	68	70	88	76	75
128	129	103	104	114	115	113	113	113	115	110	116	123	128	138	122	124	126	68	66	61	61	68	63	64	64	66	69	70	72	70	72	90	70	72	76
130	126	125	123	121	129	122	122	118	116	120	121	125	136	141	136	138	130	80	78	73	74	70	73	75	76	74	75	76	74	78	86	90	72	70	70
121	122	118	119	115	116	114	116	118	119	120	122	121	122	128	118	117	118	76	74	78	75	72	74	75	72	75	76	75	72	74	72	90	69	68	69
132	121	123	118	119	120	122	119	117	115	112	110	114	133	116	121	119	117	80	80	81	74	76	75	73	74	75	78	79	80	81	89	75	74	73	75
115	113	111	110	109	108	105	111	112	118	116	114	110	105	113	139	121	122	75	73	74	70	71	72	68	71	73	75	70	75	76	79	85	95	80	83
115	115	120	114	113	112	113	114	115	116	118	119	120	121	121	135	121	120	84	82	81	80	78	76	75	72	74	70	72	70	72	73	74	92	79	72
121	118	120	122	122	114	116	116	110	112	114	116	123	124	133	116	118	121	88	78	74	72	72	70	70	76	70	70	72	70	75	72	90	70	77	78

Mean arterial pressure																			Sedation score																			Rescue analgesia	
0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6	10	14	18	22	24	0	0.5	1	1.5	2	1.5	3	3.5	4	4.5	5	5.5	6	10	14	18	22	24	1rescue	2rescue
102	106	111	105	104	105	110	115	118	115	112	113	115	115	116	106	110	115	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	30	600
109	109	110	111	107	105	106	106	102	105	106	107	109	110	111	111	112	108	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	30	840
109	110	108	108	114	112	110	111	106	105	107	109	110	109	113	116	116	114	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	30	600
110	107	103	97	97	96	97	95	96	103	101	107	111	107	107	109	111	107	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		30	840
107	105	97	96	97	98	95	95	96	96	99	106	105	105	105	111	104	99	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	30	600
110	102	99	98	99	99	96	97	98	96	96	101	102	110	104	102	98	96	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	30	600
109	107	110	110	108	110	110	110	106	109	107	106	107	106	113	112	106	105	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	30	840
107	111	112	116	115	111	108	109	107	109	107	108	110	111	113	112	114	114	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	30	840
111	111	107	107	106	106	106	107	113	112	112	112	111	117	115	112	111	111	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	30	600
105	105	106	101	105	108	106	107	106	106	107	108	109	111	110	110	109	111	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	30	600
116	111	113	113	111	110	109	109	109	107	108	108	108	113	106	105	103	102	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	120	840
99	116	115	117	112	111	112	112	113	112	112	111	112	118	112	109	110	109	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	120	840
108	103	103	104	104	105	105	105	103	107	105	106	104	102	102	102	103	105	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	180	1080
111	101	99	98	104	105	107	106	107	106	106	110	107	112	116	104	105	103	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	180	840
112	99	96	97	103	102	101	101	102	101	106	103	103	110	101	98	98	102	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	180	1080
117	107	107	105	104	105	103	105	106	107	108	109	110	118	107	107	107	109	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	30	600
112	103	100	98	98	98	97	97	98	97	97	103	101	100	107	100	99	101	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	30	840
116	110	106	102	99	99	102	103	99	98	102	100	100	99	113	103	98	98	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	30	840
109	104	98	96	94	93	93	94	96	98	99	99	100	115	107	104	103	102	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	30	600
117	105	96	93	93	90	90	90	91	91	92	94	100	108	105	102	102	104	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	120	840
100	99	99	97	98	95	99	102	103	105	102	103	102	94	85	86	83	86	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	360	nil
97	95	96	99	99	99	100	94	93	94	93	95	96	95	92	97	95	98	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	600	nil
83	87	82	85	86	84	85	88	87	87	84	89	93	99	96	93	95	98	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	600	nil
98	96	93	89	88	87	87	90	92	93	93	91	90	99	100	91	99	100	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	600	nil
100	97	95	96	97	95	94	95	93	92	93	104	98	94	95	94	94	97	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	330	nil
96	90	89	90	94	95	96	97	95	95	94	106	101	99	96	96	97	98	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	330	nil
89	88	87	86	89	86	88	87	87	85	89	91	107	95	94	92	93	93	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	360	nil
96	95	92	96	95	96	94	94	95	96	95	95	107	104	101	97	97	92	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	360	nil
94	93	95	96	92	91	90	89	91	92	93	93	107	101	97	96	95	94	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	330	nil
93	89	86	87	88	86	87	87	88	90	91	89	96	87	90	90	89	90	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	360	nil

Mean arterial pressure																		Sedation score																		Rescue analgesia	
0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6	10	14	18	22	24	0	0.5	1	1.5	2	1.5	3	3.5	4	4.5	5	5.5	6	10	14	18	22	24	1rescue	2rescue
99	97	96	91	92	87	92	99	100	98	95	102	106	103	102	103	102	102	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	360	nil
91	87	87	89	91	95	89	90	97	98	101	100	105	102	98	97	97	98	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	360	nil
91	90	91	95	94	94	93	94	99	98	92	103	97	88	87	81	81	81	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	600	nil
90	84	88	85	79	81	84	90	89	90	88	89	95	81	85	90	93	90	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	360	nil
93	91	90	91	88	92	90	90	89	88	87	91	92	99	91	88	87	87	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	600	nil
97	98	94	92	93	91	92	92	98	98	97	96	94	102	92	90	89	89	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	600	nil
94	93	93	94	95	96	96	94	92	97	103	96	97	97	94	95	95	93	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	300	nil
97	95	97	97	94	94	95	95	99	98	96	96	97	108	100	98	96	100	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	600	nil
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PROFORMA

Pt .name : Age : Sex:

I.P.no: Group: Ht: wt:

BMI: Diagnosis: Name of surgery:

Duration of surgery:

Pre op assessement:

Investigations :

Premedication:

Induction:

Intubation:

Maintanance:

Positioning:

B/L superficial cervical plexus block: Drugs

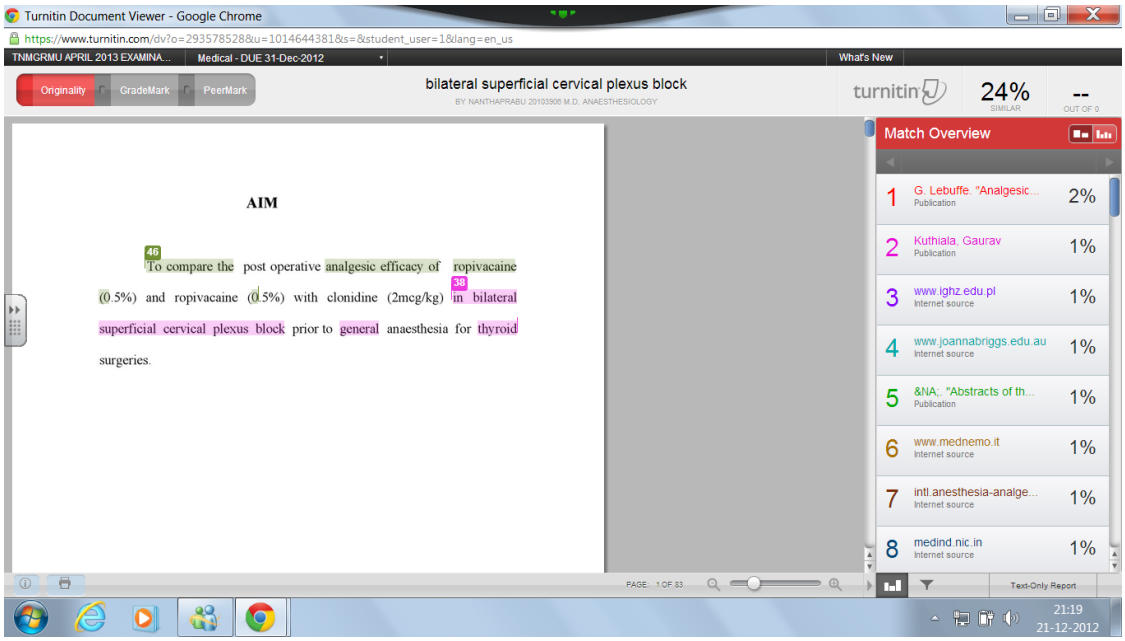
HAEMODYNAMICS: Intra operative

Events	Time	Systolic BP (mmHg)	Diastolic BP (mmHg)	MAP	Heart rate Beats/min	SPO2
Base line						
Induction						
Incision						
End of the Procedure						
Extubation						

Time(min)	*0*	*5*	*10*	*15*	*20*	*25*	*30*	*45*	*60*	*75*	*90*	*105*	*120*	*135*	*150*	*165*	*180*
HR																	
SBP																	
DBP																	
MAP																	
SpO2																	
Atracurium																	
Fentanyl																	

POST OPERATIVE

Time(hrs)	0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6	10	14	18	22	24
VAS																		
HR																		
SBP																		
DBP																		
MAP																		
Sedation Score																		
Rescue analgesic																		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bilateral superficial cervical plexus block
BY NANTHAPRABU 20103906 M.D. ANAESTHESIOLOGY
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OUT OF 0
AIM
To compare the post operative analgesic efficacy of ropivacaine (0.5%) and ropivacaine (0.5%) with clonidine (2mcg/kg) in bilateral superficial cervical plexus block prior to general anaesthesia for thyroid surgeries.
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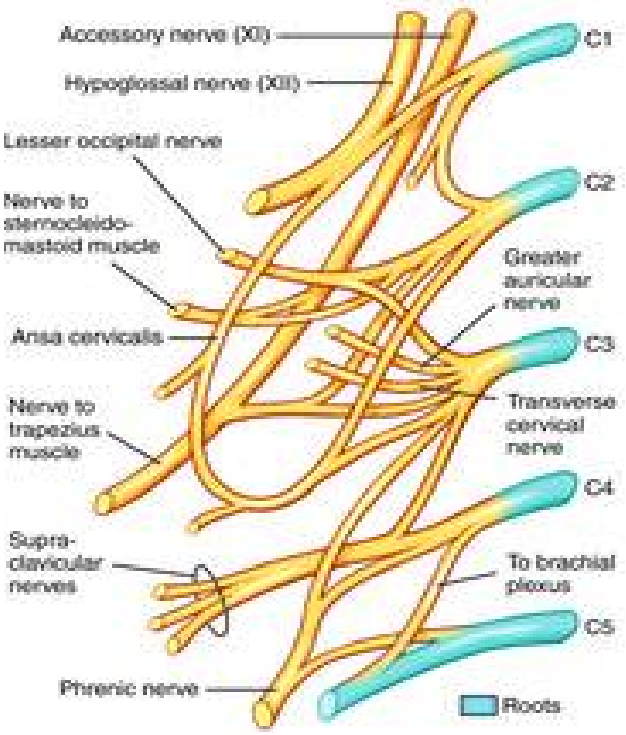
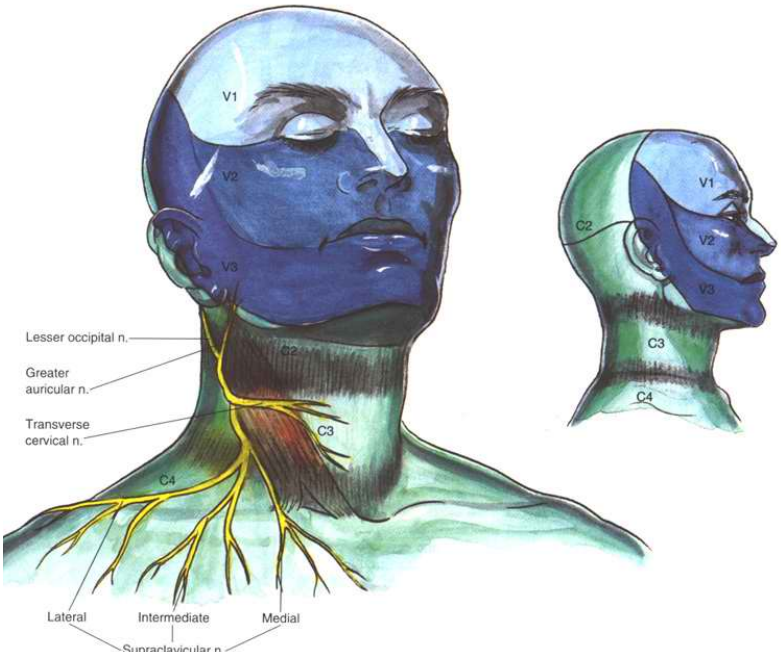
21-12-2012

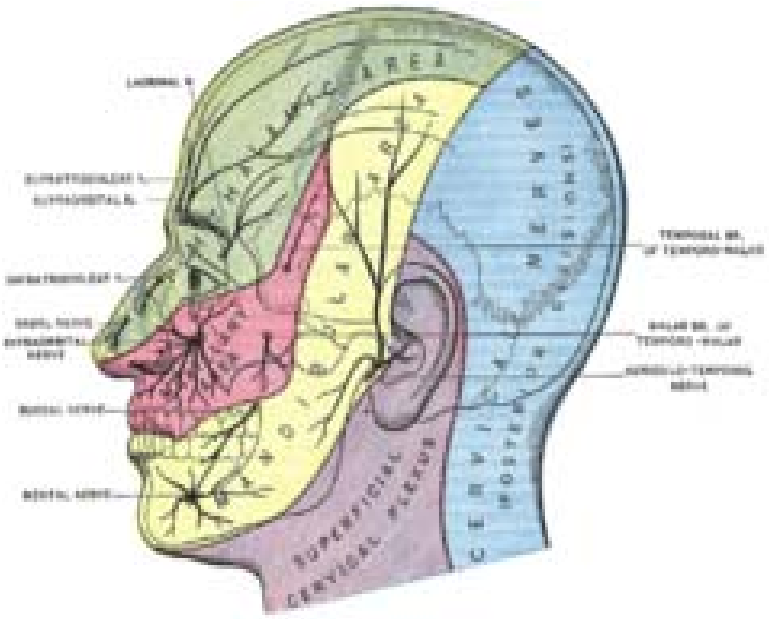
CERVICAL PLEXUS FORMATION



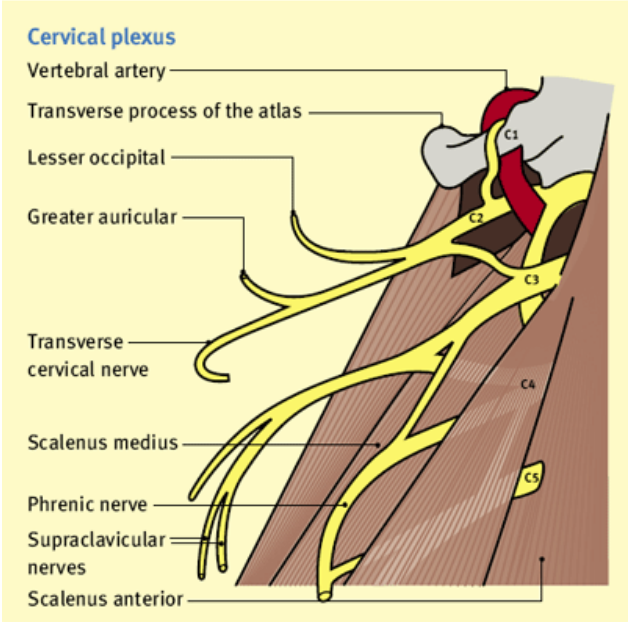
SUPERFICIAL CERVICAL PLEXUS



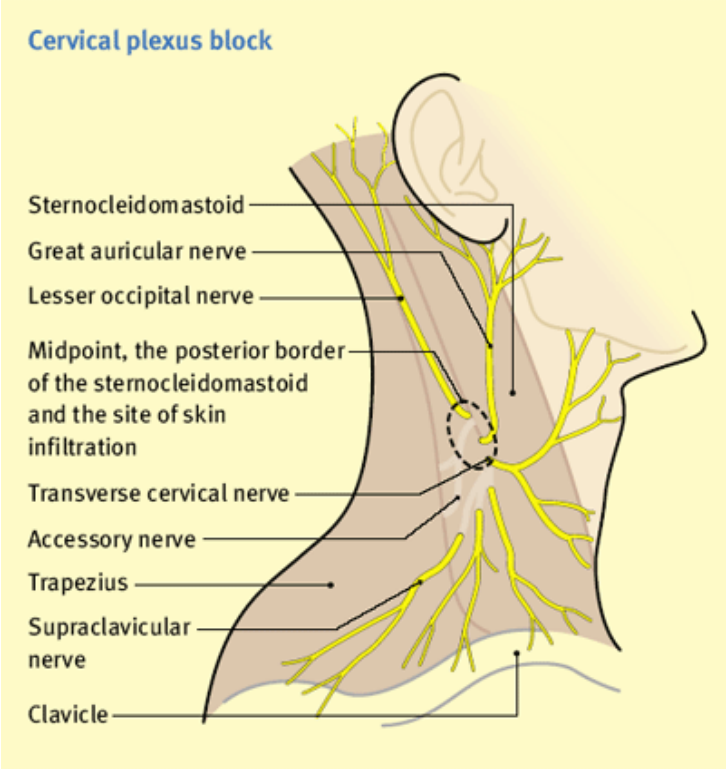
SUPERFICIAL CERVICAL PLEXUS-Cutaneous distribution

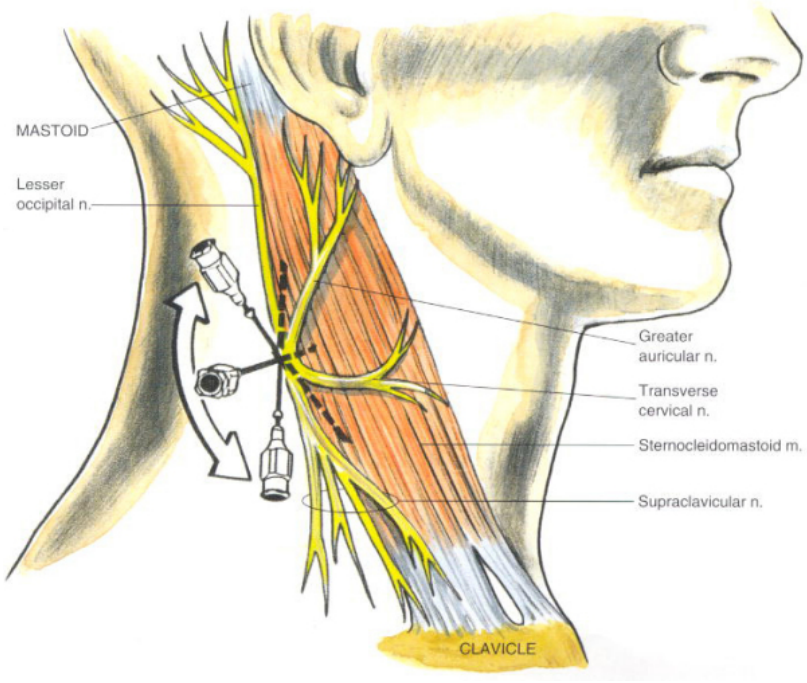


SUPERFICIAL CERVICAL PLEXUS
Branches

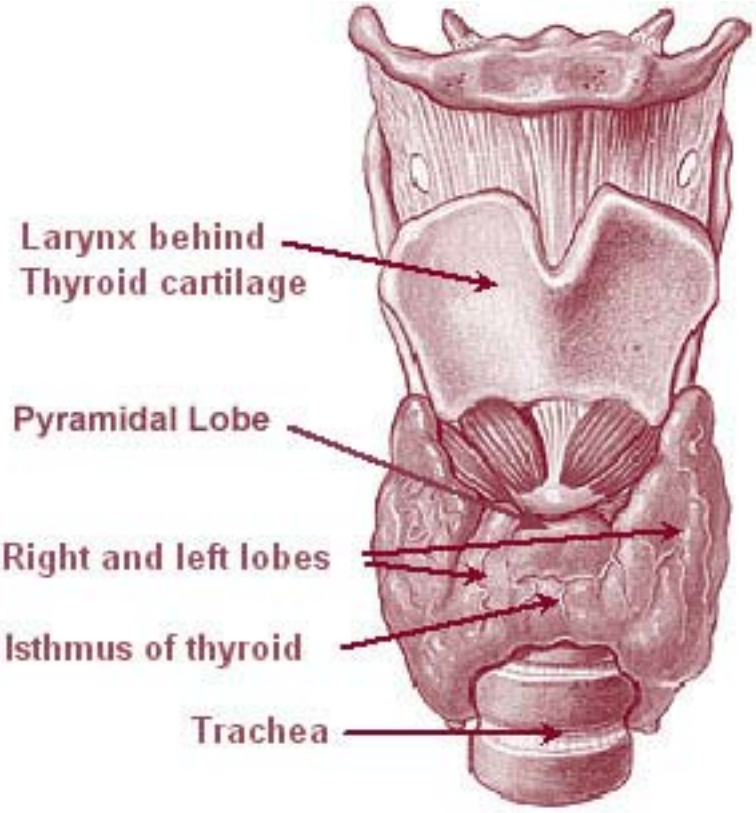


SUPERFICIAL CERVICAL PLEXUS Block Technique

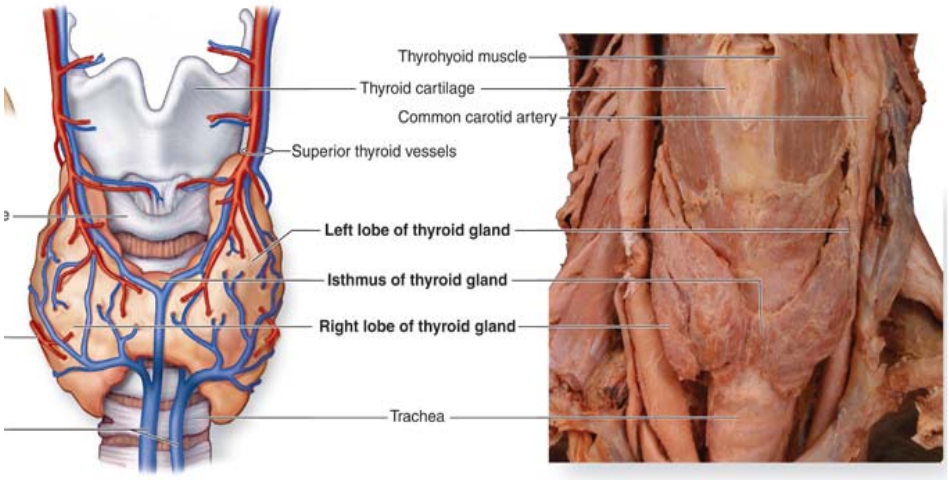




Anatomy of Thyroid Gland

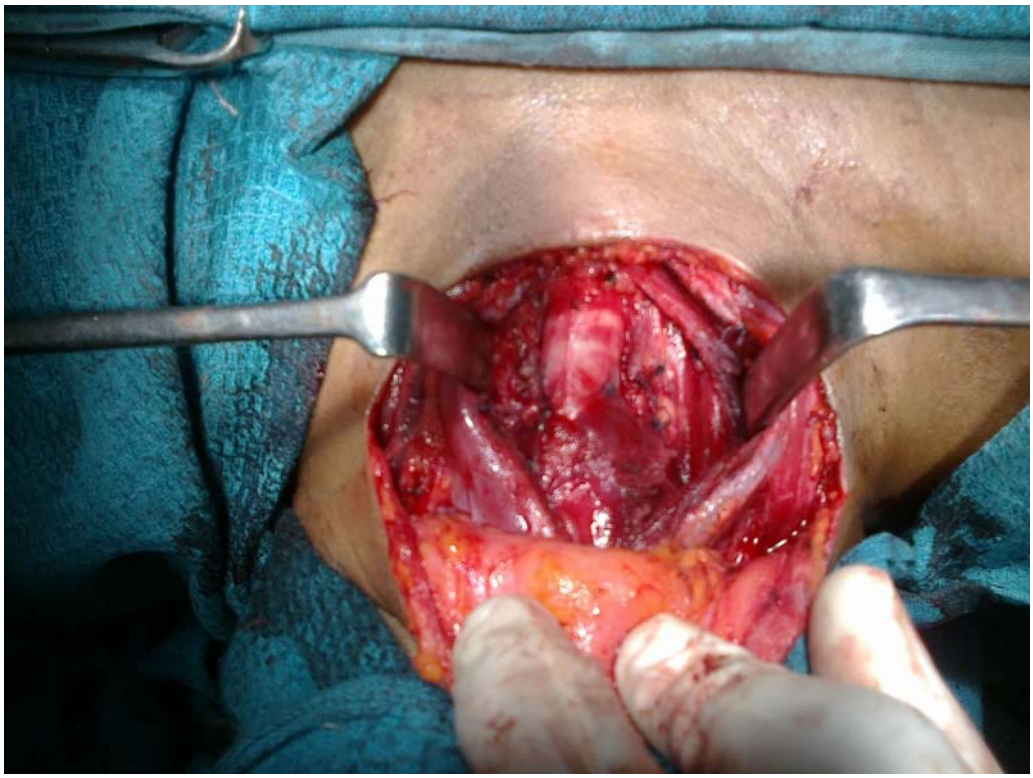


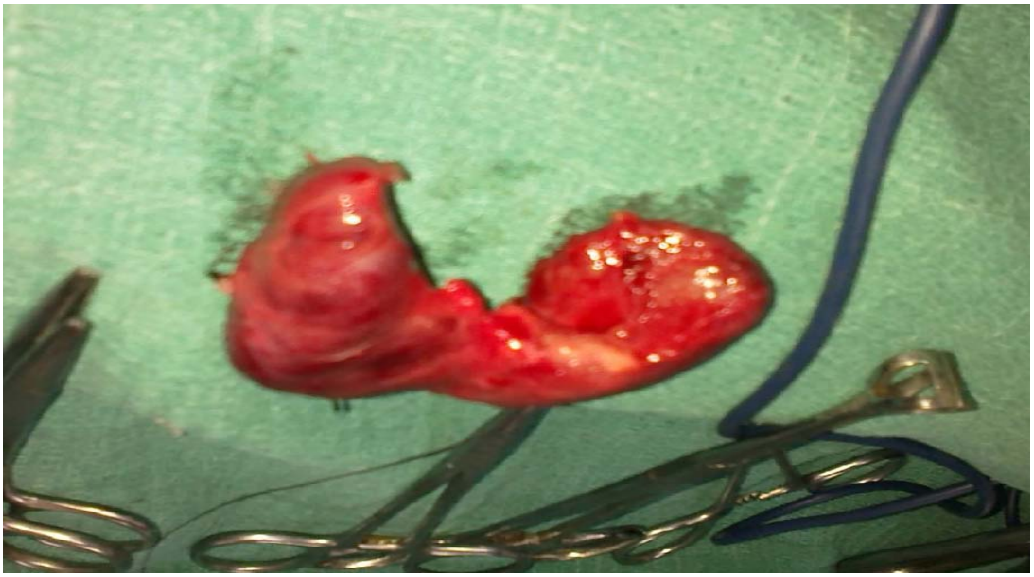
Blood supply –Thyroid Gland



SUPERFICIAL CERVICAL PLEXUS Block Technique

Intra operative picture-after thyroidectomy





3 D structure of Ropivacaine